TUpH Combination pH/ORP Sensors

396P and 396PVP

ROSEMOUNT® Analytical

EMERSON™ Process Management

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Essential Instructions
Read this page before proceeding

Emerson Process Management designs, manufactures and tests its products to meet many national and international standards. Because these sensors are sophisticated technical products, you MUST properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions MUST be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this sensor; and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, contact your Emerson Process Management representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson Process Management. Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, and VOID YOUR WARRANTY. Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

The information contained in this document is subject to change without notice.

⚠ DANGER: HAZARDOUS AREA INSTALLATION

Installations near flammable liquids or in hazardous area locations must be carefully evaluated by qualified on site safety personnel. This sensor is not Intrinsically Safe or Explosion Proof.

To secure and maintain an intrinsically safe installation, the certified safety barrier, transmitter, and sensor combination must be used. The installation system must comply with the governing approval agency (FM, CSA or BASEEFA/CENELEC) hazardous area classification requirements. Consult your analyzer/transmitter instruction manual for details.

Proper installation, operation and servicing of this sensor in a Hazardous Area Installation is entirely the responsibility of the user.

⚠ CAUTION: SENSOR/PROCESS APPLICATION COMPATIBILITY

The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

⚠ ATEX DIRECTIVE: Special Conditions for safe use

1. **All pH/ORP sensors have a plastic enclosure which must only be cleaned with a damp cloth to avoid the danger due to a build up of an electrostatic charge.**
2. **All pH/ORP sensor Models are intended to be in contact with the process fluid and may not meet the 500V r.m.s. a.c. test to earth. This must be taken into consideration at installation.**

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The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

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About This Document

This manual contains instructions for installation and operation of the 396P and 396PVP Sensors. The following list provides s concerning all revisions of this document.

Rev. Level	Date	Notes
A	2/2013	Manual updated with SMART sensor information.
B	8/2013	Wiring diagrams updated.

Contents

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Section 1: Description and Specifications

1.1 Features and Applications

TUpH™ pH/ORP-sensors are now offered with SMART capabilities. SMART option becomes enabled when used with the 1056, 1057, 1066, and 56 Analyzers and on 6081P wireless transmitter. The pH-loop capabilities include auto-recognition of the SMART sensor, automatic upload of calibration data and associated time stamp, historical recording of pH diagnostics (slope, offset, reference impedance, glass impedance). This trending data allows technicians to predict frequency of maintenance and estimate sensor life for a particular process condition. Additional SMART features include factory calibration, resetting SMART sensor calibration data with user menus, and manufacturing information.

The TUpH large area reference junction for minimum maintenance requirements: The reference junction provides an electrical connection between the reference electrode and the sample, and helps maintain a stable reference potential, regardless of the change in sample pH. The TUpH reference electrode junction, the entire plastic tip surrounding the glass pH electrode, maintains a steady reference signal even in the dirtiest of applications because it resists plugging (a common cause of pH signal drift). This large reference junction area is made of micron sized reference pathways used for ionic exchange so it resists plugging by large particles and will continue to send a steady pH signal, even in the dirtiest of applications. The TUpH reference junction technology has been field-proven for minimum maintenance requirements.

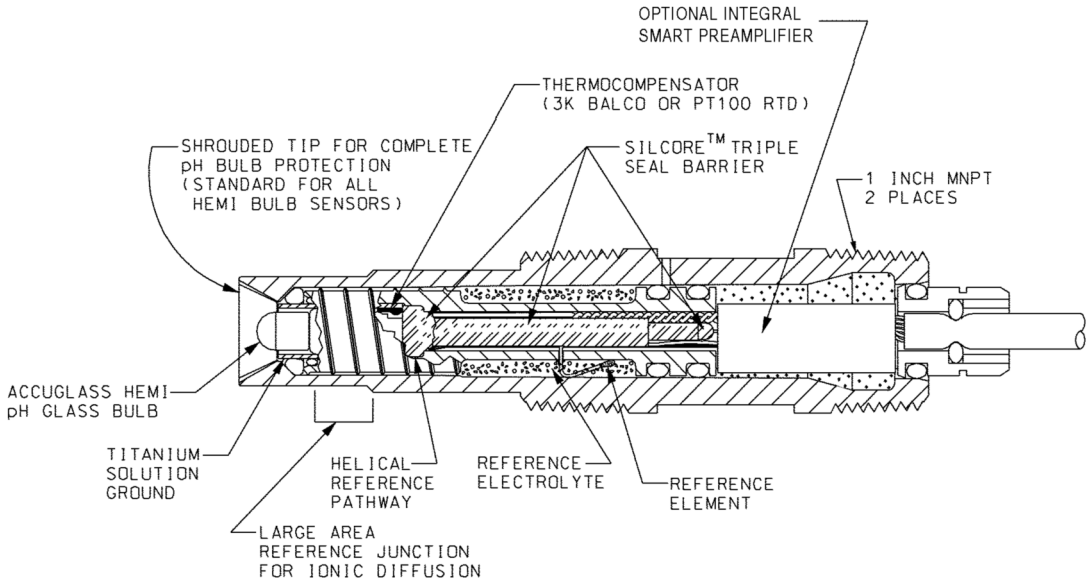
The TUpH helical reference pathway stops reference poisoning. Ions diffuse through the reference pathways and a charge is passed to the reference element. The reference element must be protected from contamination by poisoning ions such as sulfide, mercury, cyanide, and ammonia or else the pH signal will drift. The TupH sensor's long internal helical reference pathway hinders and slows down the rate of contaminants migrating to the reference element therefore providing for a longer sensor life.

The entire line of TUpH model sensors now incorporate the **new SILCORE™ technology** contaminant barrier. This triple-seal barrier prevents moisture and material impurities from migrating to the pH sensor’s reference electrode’s metal lead wire. By preventing these contaminants from compromising the integrity of the pH measurement, sensor life is increased, especially at higher temperatures where increased migrations occur. In addition, the SILCORE technology provides added protection against sensor failure due to vibrations and shock by transferring damaging energy away from the glass-to-metal seal.

The AccuGLASS™ pH glass formulations exceed industry standards. The AccuGlass pH glass is a result of many years of glass research resulting in a formulation which has been found to increase the life of the sensor. Unlike other pH glasses presently on the market, this glass resists cracking especially at higher temperatures and reduces sodium ion error commonly found in high pH applications. Overall, the AccuGlass formulation enhances the sensor performance to measure pH more accurately and have a longer sensor life than ever before.

A choice of flat or hemi glass pH glass electrodes is available to best meet various application needs. Flat glass is advantageous in abrasive or coating applications that etch or build up on glass, respectively. In coating applications, such as slurries, the flat surface allows the process flow to act as a scrubbing agent to reduce coating and maintenance. In abrasive applications pitting from silicates and other similar materials is minimized by the flat glass surface to provide longer sensor life. Flat glass sensors are offered with a flat tip which is flush with the flat glass. The hemi bulb glass is ideal for general purpose use and for those processes requiring greater accuracy over the entire pH range. All hemi bulb sensors are offered with a standard shrouded tip which completely surrounds the glass bulb for protection against solids. An optional slotted tip is also available and

FIGURE 1-1. Cross Section Diagram of the TUpH Reference Technology. All TUpH sensors are designed with a large area reference junction, helical reference pathway, and an AccuGlass pH glass bulb. This sensor technology ensures superior performance while only requiring minimal maintenance.



allows the process to flow by the glass electrode for accurate and reliable pH measurement. Both pH glass bulbs — the standard hemi or optional flat pH glass — are exceptional for increased resistance to high temperature and other effects of aging for longer life.

The TUpH reference junction and helical pathway combined with the AccuGLASS pH glass performs exceptionally well in dirty, high solid applications and requires only minimum maintenance. This is the toughest pH sensor on the market and is still unmatched by all other pH sensors. The constant increase in demand for the TUpH sensor proves it's success as the best process industry pH sensor.

All TUpH sensor models have been specifically designed for improved life in harsh, dirty, and abrasive applications such as lime slurry, waste treatment, paper machine headbox, and pigment/dye applications, where large quantities of suspended solids are present. Various sensor materials, depending on the sensor model, are available for a variety of different application needs.

SMART is the standard option. A preamplifier converts the high impedance pH signal into a stable, noise-free signal and must be used with all pH sensors. An integral SMART preamplifier stores calibration information and can be built into the sensor when ordering the SMART preamplifier option. Otherwise, a standard preamplifier can be used in a junction box or built into the analyzer/transmitter. All integral preamplified SMART TupH Sensors are compatible with all Rosemount Analytical instruments.

The 396VP, 396PVP, and 396RVP are offered with a watertight VP sensor-to-cable connector which eliminates rewiring and cable twisting when replacing sensors. The VP (Variopol) multiple pin connector is an integral part of each sensor model and uses a mating VP cable. Once the cable is installed and wired to the analyzer, sensors are easily replaced without replacing the cable, without rewiring the analyzer (if the replacement sensor is the same as its predecessor). Also the sensor can be disconnected from the cable before removal from the process which eliminates cable twisting. VP8 cable assemblies work with all VP sensors. VP8 wiring is standard across all pH sensor families. VP8 is required when used with SMART preamplified sensors.

The 396P and 396PVP sensors are available in two configurations: the standard shrouded tip, in which the pH glass is completely recessed within the reference junction for abrasive or rough applications, and the optional slotted tip with a partially exposed pH glass for viscous or low flow applications.

The 396P and 396PVP sensors feature a titanium solution ground, constructed in an annular design around the pH/ORP electrode. The solution ground provides advanced sensor diagnostics for preventative maintenance when used with Rosemount Analytical 54e, 56, 1056, 1057, 5081, 6081, 1066, and XMT instruments. In addition, the Model 396P sensor can be used with most non-diagnostic Rosemount Analytical and other manufacturers' instruments.

The 396P and 396PVP sensor is housed in a molded polypropylene body with EPDM seals, making it virtually indestructible and chemically resistant. Complete encapsulation eliminates leakage or high humidity problems traditionally found in other pH/ORP designs. The simplified construction, designed with user convenience in mind, does not require electrolyte (KCl) replenishment or any high maintenance troubleshooting procedures.

The 396 and 396VP TUpH Sensors are housed in a stainless steel body with optional 1" threaded connector suitable for insertion, submersion or flow through installation. The sensor includes a general purpose glass pH electrode in the standard bulb or optional flat glass configuration. The TUpH reference has a large area polypropylene junction with a gel filled reference electrolyte. The 396 and 396VP TUpH are available with an optional SMART integral preamplifier when choosing the 396VP-55 option. Automatic temperature compensation is standard 3K Balco or Pt 100 RTD.

The 396R and 396RVP Sensors are designed for use with a 1-1/4 in. or 1-1/2 in. ball valve for hot tap installation. The 396R and 396RVP are constructed of molded polypropylene housed in a titanium tube with EPDM seals to provide maximum chemical resistance. The sensors feature a titanium solution ground used for advanced sensor diagnostics when used with Rosemount Analytical 54e, 56, 1056, 1057, 5081, 6081, 1066, and XMT instruments. These advanced sensor diagnostics provide preventative maintenance by notifying the operator of the need for replacement and cleaning of an aged or fouled sensor, thus allowing continuous optimum performance.

The Rosemount Analytical 54e, 56, 1056, 1057, 1066, 5081, 6081, and XMT instruments offer advanced sensor diagnostics to provide preventative maintenance by notifying the operator of the need for replacement and cleaning of an aged or fouled sensor, thus allowing continuous optimum performance. The 396R and 396RVP sensors also feature a slotted tip for protection from breakage while allowing the process to flow by the glass electrode for accurate and reliable pH measurement.

1.2 Specifications - General

Measurements and Ranges: pH*: 0-14 / ORP: -1500 to 1500 mv

Available pH ACCUGLASS Types: GPLR hemi or flat glass

Wetted Materials: Titanium, Polypropylene, EPDM, glass; platinum (ORP only)

Process Connection: 1 in. MNPT front and rear facing threads

Temperature Range: 0-100°C (32-212°F)

Pressure Range-Hemi bulb: 100-1135 kPa [abs] (0-150 psig)

Pressure Range-Flat bulb: 100-790 kPa [abs] (0-100 psig)

Minimum Conductivity: 100 µS/cm

Integral Cable 396P: Code 01 - 25 ft; Code 02 - 15 ft coaxial / 396PVP: none - must use mating VP cable

Preamplifier Options: Remote or Integral SMART preamplifier

Weight/Shipping Weight: 0.45 kg/0.9 kg (1 lb/2 lb)

Weight/Shipping Weight: 0.45 kg/0.9 kg (1 lb/

*Percent Linearity

pH Range	396 / 396VP		396P / 396PVP		396R / 396RVP	
	GPHT Hemi	GPHT Flat	GPHT Hemi	GPLR Flat	GPHT Hemi	GPHT Flat
0-2 pH	94%	95%	94%	–	94%	93%
2-12 pH	99%	99%	97%	98%	97%	98%
12-13 pH	97%	96%	98%	95%	98%	95%
13-14 pH	92%	–	98%	–	98%	–

1.3 Ordering Information

The 396P Sensor is housed in a molded reinforced polypropylene body with 1 in. MNPT threads suitable for insertion, submersion or flow through installation. The sensor includes a general purpose pH electrode or a platinum ORP electrode, a reference junction and a solution ground. The 396P comes standard with a recessed electrode; an optional slotted tip is also available. In addition, the 396P features an optional integral hermetically sealed preamplifier and 15 ft or 25 ft cable lengths. Automatic temperature compensation, Pt 100 or 3K Balco, is standard with the 396P.

The 396P insertion/submersion sensor shown with the fully recessed bulb (standard option).

396P TUpH INSERTION/SUBMERSION POLYPROPYLENE pH/ORP SENSOR	
CODE	PREAMPLIFIER/CABLE (Required Selection)
01	With integral SMART preamplifier, 25 ft (7.6m) cable
02	Without integral preamplifier, 15 ft (4.6m) cable

CODE	MEASURING ELECTRODE TYPE (Required Selection)
10	GPLR hemi bulb, General Purpose Low Resistivity (0-14 pH)
12	ORP
13	GPLR flat bulb, General Purpose Low Resistivity (2 - 13 pH)

CODE	ANALYZER/TC COMPATIBILITY (Required Selection)
50	For 1181 (3K TC)
54	For 1054A/B, 2054, 2081 (Pt 100 RTD)
55	For 54e, 3081, 81, 4081, 1055, 5081, Xmt (PT-100 RTD)

CODE	OPTIONAL SELECTION
41	Slotted Tip (not available on flat bulb sensors)
396P - 01 - 10 - 55	**EXAMPLE**

NOTE: The 396P is also compatible with Model SCL-P/Q (option 02-54 only).

The 396PVP Sensor has similar features to the 396P. However, the 396PVP is offered with the Variopol (VP) connector and uses a mating VP cable (purchased separately).

A Variopol cable is required for all new installations. See below for cable selection.

The 396PVP insertion/ submersion sensor with the VP (Variopol) connector

Variopol connector shown with mating variopol cable receptacle

396PVP TUpH INSERTION/SUBMERSION POLYPROPYLENE pH/ORP SENSOR	
CODE	MEASURING ELECTRODE
10	pH GPLR Glass, General Purpose Low Resistivity (0 - 14 pH)
12	ORP
13	GPLR Flat Bulb, General Purpose Low Resistivity (2 - 13 pH)

CODE	MEASURING ELECTRODE
50	For use with Model 1181pH/ORP (3K TC)
54	For use with Models: 1054, 2054; Series 2081 (Pt-100)
55	For use with Models: 54, 56, 1055, 1056, 1057, 81,3081, 4081, 5081, 6081 XMT (Pt-100)

CODE	OPTIONAL
–	No Selection
41	Slotted Tip

CODE	PREAMPLIFIER OPTION
–	No Preamplifier
70	With Integral Smart Preamplifier for 396PVP; available with 396PVP-10-55 and 396PVP-13-55 only

Examples of all sensing tip offerings

Shrouded Tip is standard on all hemi bulb sensors

Optional Slotted Tip is available on all hemi bulb sensors, ordered as option -41

Flat Tip is available with flat glass bulb sensors

Accessories

Connector cable, VP8 (required for all first time installations of VP sensors)	
24281-00	15 ft. (4.6m) VP8 cable
24281-01	25 ft. (7.6m) VP8 cable
24281-03	50ft (15.2m) VP8 Cable
24281-04	100ft (30.5m) VP8 Cable
24281-06	10ft (3.0m) VP8 Cable
24281-07	20ft (6.1m) VP8 Cable
24281-08	30ft (9.1m) VP8 Cable
Remote Junction Boxes and Mounting Brackets; for use when standard cable lengths need to be extended	
23555-00	Junction Box; contains preamplifier for 54e, 56, 1055, 1056, 1057, 1066, 3081, 4081, 5081, 6081, XMT
23550-00	Junction Box with board for point-to-point cable extension; use with sensors containing integral preamplifiers
2002565	Mounting Bracket Kit with mounting plate and U-bolts; use with PN 23555-00 or 23550-00 junction boxes
Extension Cables (required when using a remote junction box)	
23646-01	Extension Cable, 11-conduit with shields, wires prepared for easy installation, per foot (or meter); best choice for easiest installation
9200273	Extension Cable, 11-conduit with shield, raw cable (user must cut and prepare cable ends), per foot (or meter)
Calibration Accessories	
9210012	Buffer Solution, pH 4.01, 16 oz (473 ml)
9210013	Buffer Solution, pH 6.86, 16 oz (473 ml)
9210014	Buffer Solution, pH 9.18, 16 oz (473 ml)
R508-8OZ	ORP Standard, 475mV, 8oz (236 ml)
Mounting Assemblies	
11275-01	Handrail Mounting Assembly; includes a 6 ft straight pipe, pipe coupling, 6 ft long sweep pipe, unistrut, pipe clamps, and mounting channels
2002011	CPVC flow through Tee, 1-1/2" NPT process connections
24091-00	Low Flow Cell with 1/4 inch inlet and outlet
915240-03	Tee, Flow-through, 2" PVC tee with " NPT process connections and mounting adapter to eliminate cable twisting
915240-04	Tee, Flow-through, 2" PVC tee with 1" NPT process conections and mounting adapter to eliminate cable twisting
915240-05	Tee, Flow-through, 2" PVC tee with 1 " NPT process connections and mounting adapter to eliminate cable twisting
12707-00	Jet Spray Cleaner; for use with water or air cleaning using interval timer from instrument

Section 2: Installation

2.1 Unpacking and Inspection

Inspect the outside of the carton for any damage. If damage is detected, contact the carrier immediately. Inspect the hardware. Make sure all the items in the packing list are present and in good condition. Notify the factory if any part is missing. If the sensor appears to be in satisfactory condition, proceed to Section 2.2, Mounting.

NOTE: Save the original packing cartons and materials as most carriers require proof of damage due to mishandling, etc. Also, if it is necessary to return the sensor to the factory, you must pack the sensor in the same manner as it was received. Refer to Section 6.0 for return instructions. If the sensor is to be stored, the vinyl boot should be filled with pH buffer solution and replaced on sensor tip until ready to use.

⚠ CAUTION

Buffer solution, in the vinyl boot, may cause skin or eye irritation.

⚠ WARNING

Glass electrode must be wetted at all times (in storage and in line) to maximize sensor life.

2.2 Mounting

The sensor has been designed to be located in industrial process environments. Temperature and pressure limitations must not be exceeded at any time. A caution label regarding this matter is attached to the sensor. Please do not remove the label. See Figure 2-1.

⚠ CAUTION

Internal electrolyte fill solution may cause skin or eye irritation.

Mounting Guidelines:

1. Shake the sensor in a downward motion to remove any air bubbles that may be present inside the tip of the pH glass.
2. Do not install the sensor on the horizontal. The sensor must be 10° off the horizontal to ensure accuracy.
3. Do not install the sensor upside down.
4. Air bubbles may become trapped in the sensor end between the glass bulb and the sensor body. This problem is most commonly encountered in areas of low flow or during calibration. Shake the probe while immersed in solution to remove bubbles. This problem can be avoided by ordering the sensor with the slotted tip (option -41).

In most cases, the pH sensor can simply be installed as shipped and readings with an accuracy of ± 0.6 pH may be obtained. To obtain greater accuracy or to verify proper operation, the sensor must be calibrated as a loop with its compatible analyzer or transmitter.

2.2.1 Flow Through and Insertion Mounting

396P and 396PVP Sensors have a 1-inch MNPT process connection at the front of the sensor for mounting into a 1-1/2 inch tee or the process pipes. See Figure 2-2 through Figure 2-7 for installation configurations.

NOTE: LARGE PIPE WRENCHES MUST NOT BE USED TO TIGHTEN THE SENSOR INTO A FLANGE OR OTHER TYPE OF MOUNTING.

2.2.2 Submersion Mounting

396P and 396PVP Sensors also have a 1 inch MNPT process connection at the back of the sensor. Utilizing a standard 1 inch union, the sensor may be mounted to a 1 inch SCH 80 CPVC or PVDF standpipe. Tapered pipe threads in plastic tend to loosen after installation. It is therefore recommended that Teflon1 tape be used on the threads and that the tightness of the connection be checked frequently to assure that no loosening has occurred. To prevent rain water or condensation from running into the sensor, a weatherproof junction box is recommended. The sensor cable must be run through a protective conduit for isolation from electrical interference or physical abuse from the process. The sensor should be installed within 80° of vertical, with the electrode facing down. The sensor's cable should not be run with power or control wiring.

Figure 2-1. Dimensional Drawing

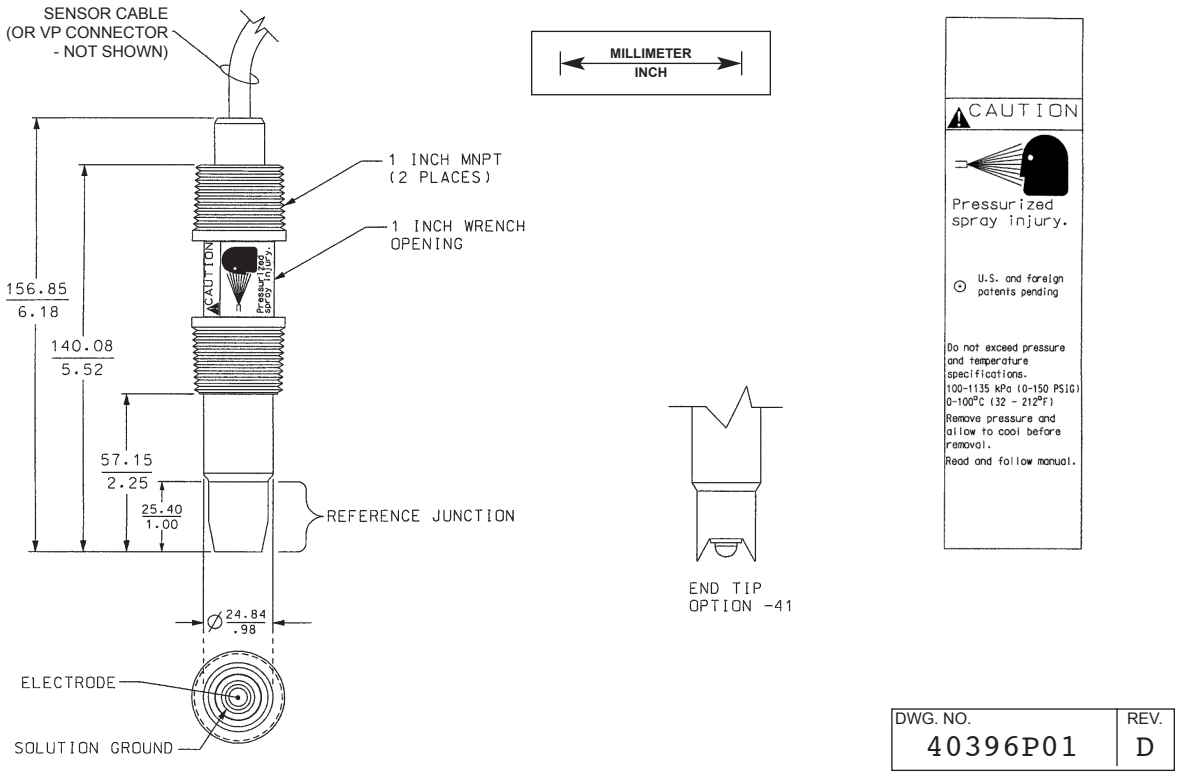
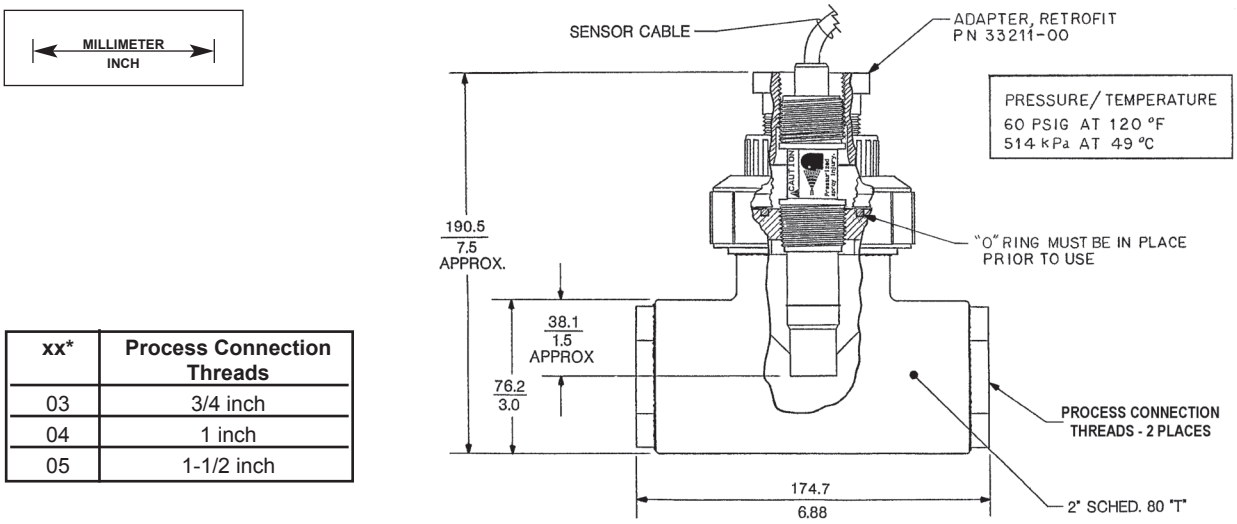


Figure 2-2. Flow-Through Tee with Adapter (PN 915240-xx*)



xx*	Process Connection Threads
03	3/4 inch
04	1 inch
05	1-1/2 inch

Figure 2-3. Flow-Through and Insertion Installations

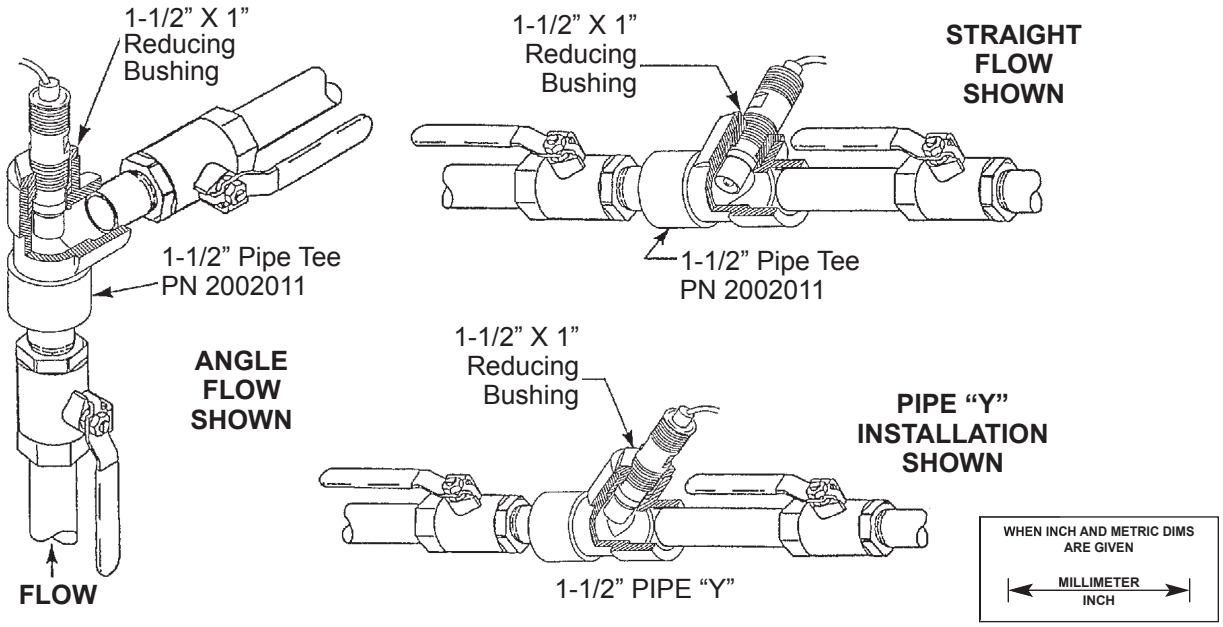


Figure 2-4. 396P with Insertion Mounting Adapter (PN 23242-02). Not for use with 396PVP. Mounting adapter allows for sensor removal without twisting or disconnecting interconnecting cable for ease of maintenance.

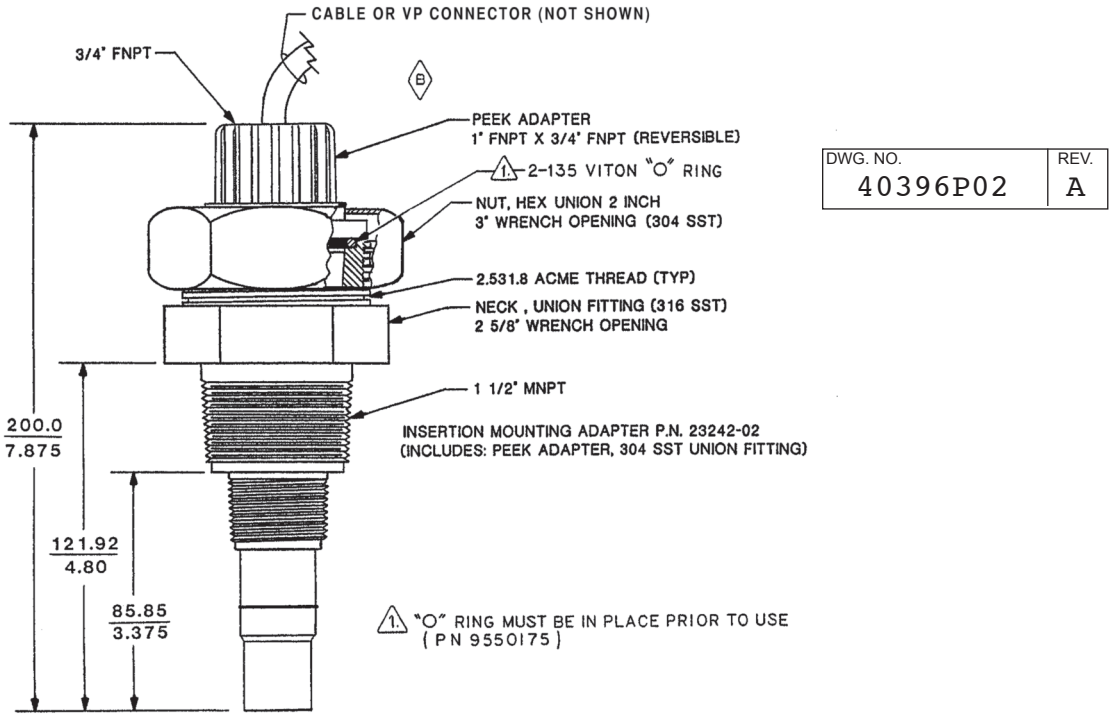
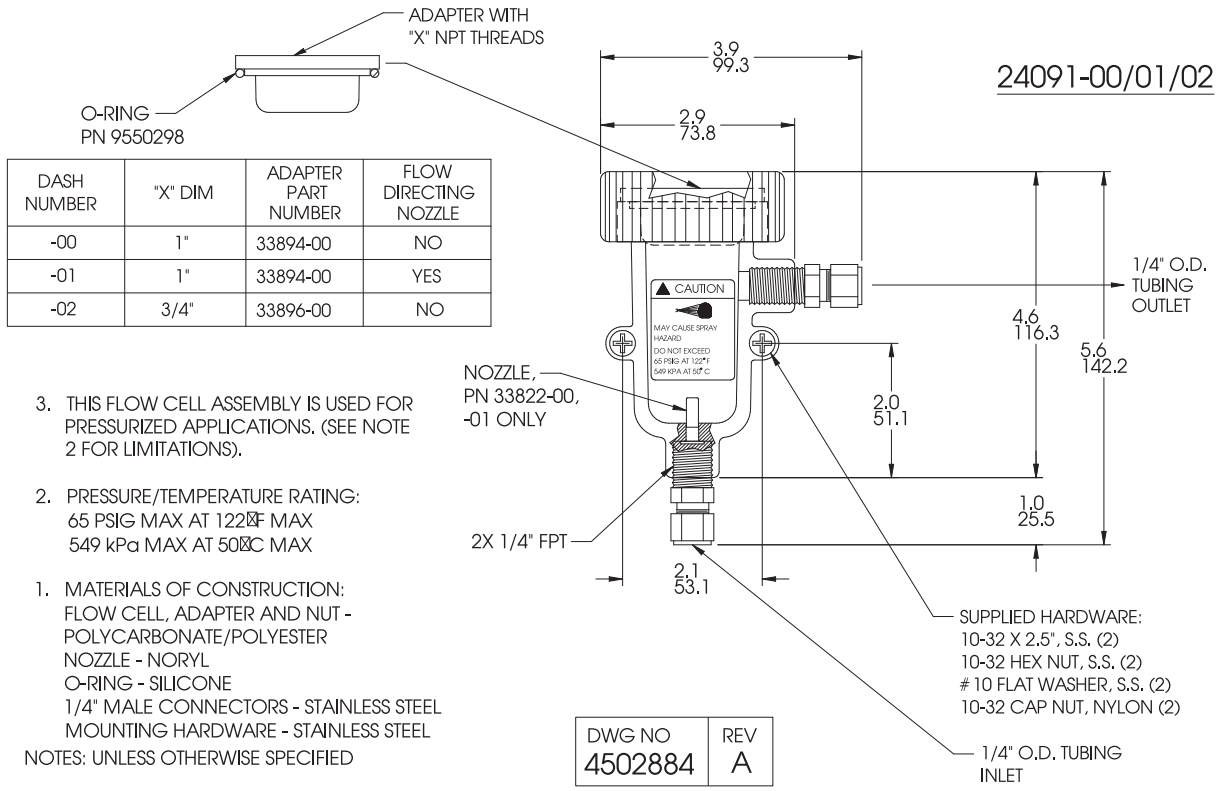


Figure 2-5. Low flow cell PN 24091-00



DASH NUMBER	"X" DIM	ADAPTER PART NUMBER	FLOW DIRECTING NOZZLE
-00	1"	33894-00	NO
-01	1"	33894-00	YES
-02	3/4"	33896-00	NO

3. THIS FLOW CELL ASSEMBLY IS USED FOR PRESSURIZED APPLICATIONS. (SEE NOTE 2 FOR LIMITATIONS).

2. PRESSURE/TEMPERATURE RATING:
65 PSIG MAX AT 122☒F MAX
549 kPa MAX AT 50☒C MAX

1. MATERIALS OF CONSTRUCTION:
FLOW CELL, ADAPTER AND NUT - POLYCARBONATE/POLYESTER
NOZZLE - NORYL
O-RING - SILICONE
1/4" MALE CONNECTORS - STAINLESS STEEL
MOUNTING HARDWARE - STAINLESS STEEL

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 2-6. Submersion Installations

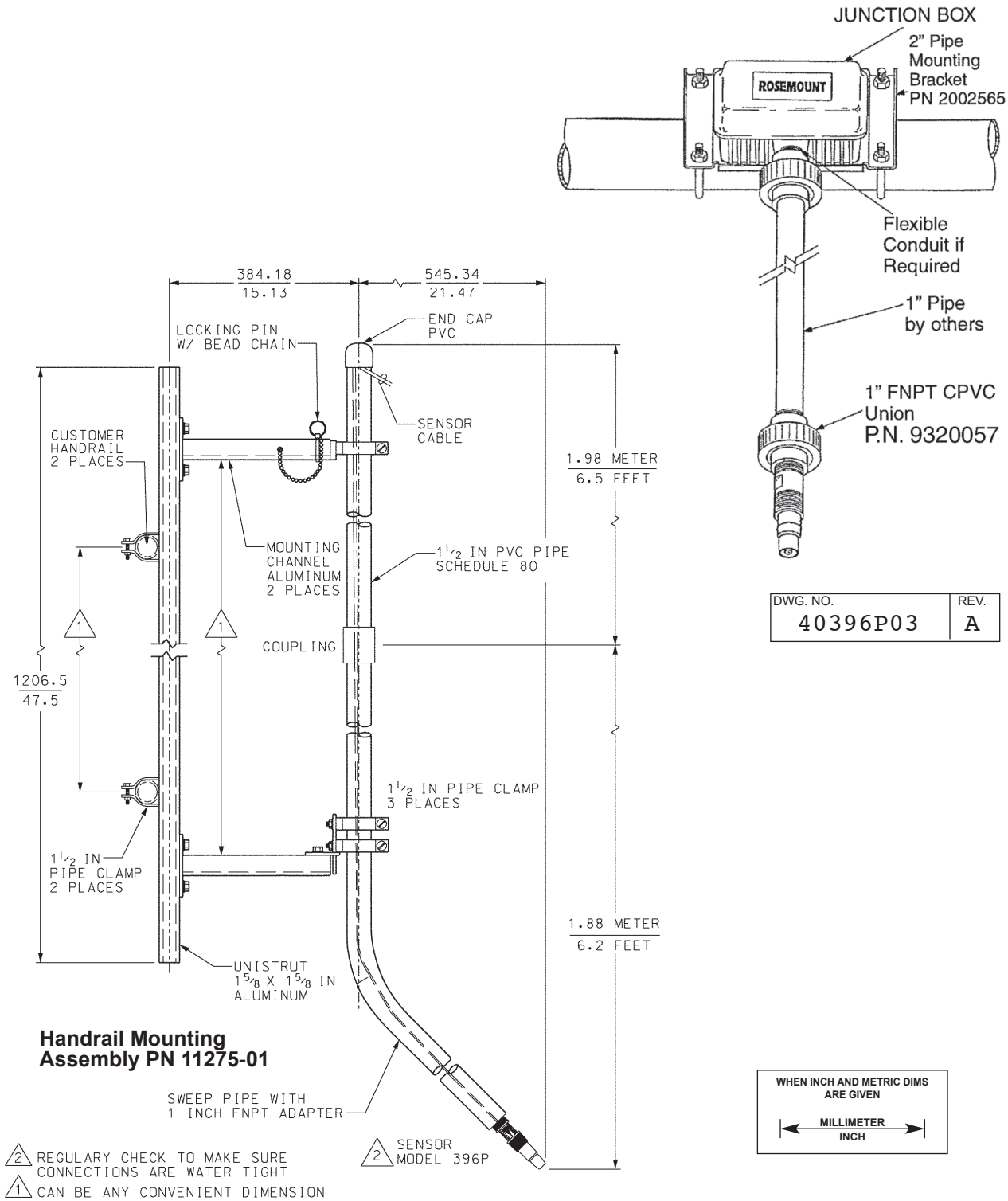
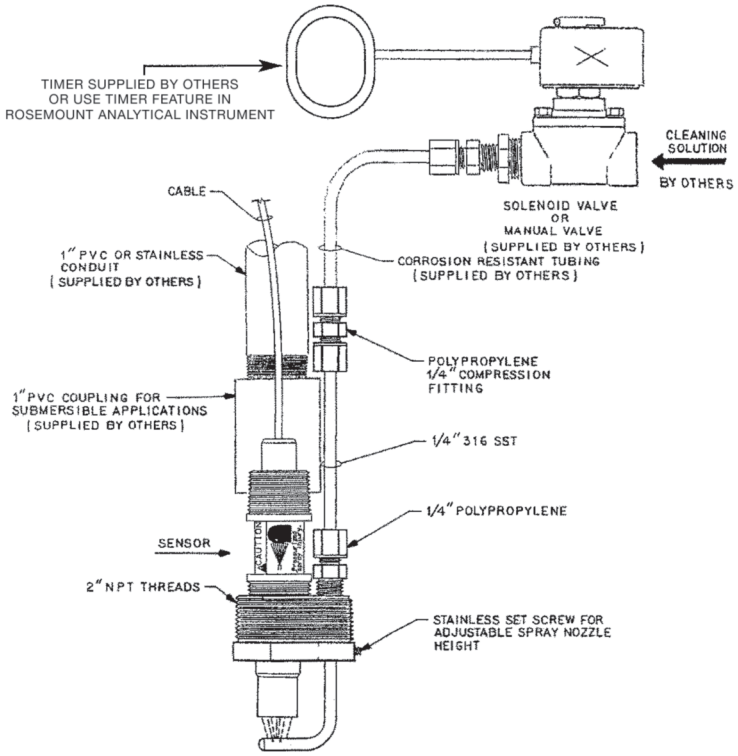


Figure 2-7. Spray Wash Assembly PN 4091-00



Section 3: Wiring

3.1 General

Figures in this section provide the guidelines for wiring the 396P-01 sensor to various Analyzer/Transmitter instruments.

To determine which wiring guideline to use, locate the model number of the sensor to be installed.

1. If the cable needs to be extended, use a high quality eleven conductor double shielded instrument cable available from Rosemount Analytical. Refer to Table 3-1 for the appropriate junction box to use and the corresponding wiring details.

NOTE: If the cable is too long, loop up the excess cable. If the cable has to be shortened, cut and terminate each conductor neatly and make sure that the overall (outermost) drain wire is not shorted out with either of the two inner drain wires (shields).

2. Signal cable should be run in a dedicated conduit (preferably an earth grounded metallic conduit) and should be kept away from AC power lines. For your convenience, a wire nut kit is furnished (in a plastic bag wrapped around the cable).

NOTE: For maximum EMI/RFI protection when wiring from the sensor to the junction box, the outer braid of the sensor should be connected to the outer braided shield of the extension cable. The outer braid of the extension cable to the instrument must be terminated at earth ground or by using an appropriate metal cable gland fitting that provides a secure connection to the instrument cable.

Wiring

The 396P and 396PVP has an optional built-in preamplifier and is offered with a shielded cable. The cable should be handled carefully and kept dry and free of corrosive chemicals at all times. Extreme care should be used to prevent it from being twisted, damaged or scraped by rough, sharp edges or surfaces.

⚠ DANGER

DO NOT CONNECT SENSOR CABLE TO POWER LINES. SERIOUS INJURY MAY RESULT.

NOTE: Remove electrical tape or shrink sleeve from gray reference wire before connecting wire to terminal.

NOTE

For additional wiring information on this product, including sensor combinations not shown here, please refer to either our online wiring programs or the Manual DVD enclosed with each product.

1056, 1057, 56, 5081, 6081, 54e, and XMT :
http://www3.emersonprocess.com/raihome/sp/liquid/wiring/XMT/

1066 and sensors with SMART preamps:
http://www2.emersonprocess.com/en-US/brands/rosemountanalytical/Liquid/Sensors/Pages/ Wiring_Diagram.aspx

1055:
http://www3.emersonprocess.com/raihome/sp/liquid/wiring/1055/

Figure 3-1. Wiring for 396P-01 (Gray Cable) and 54e pH/ORP

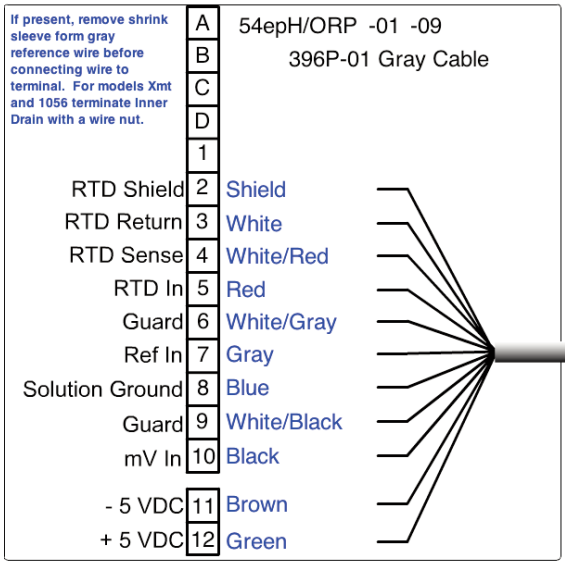


Figure 3-2. Wiring for 396P-01 (Blue Cable) and 54e pH/ORP

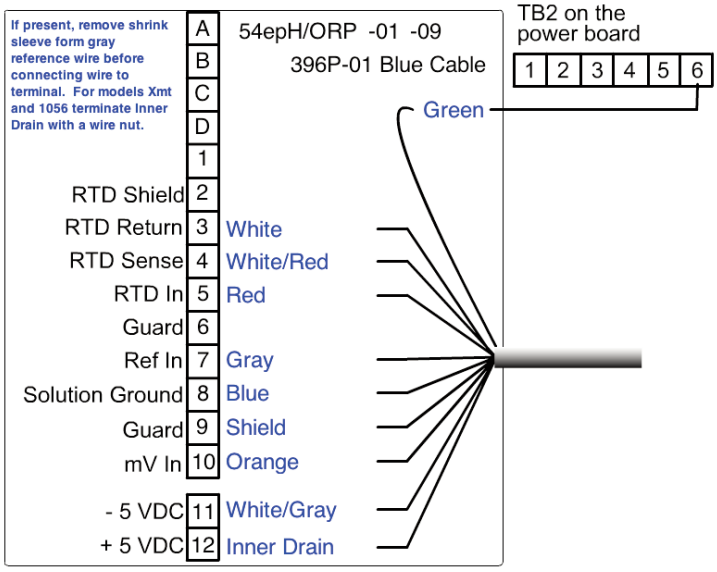


Figure 3-3. Wiring for 396P-02 (Gray Cable) and 54e pH/ORP

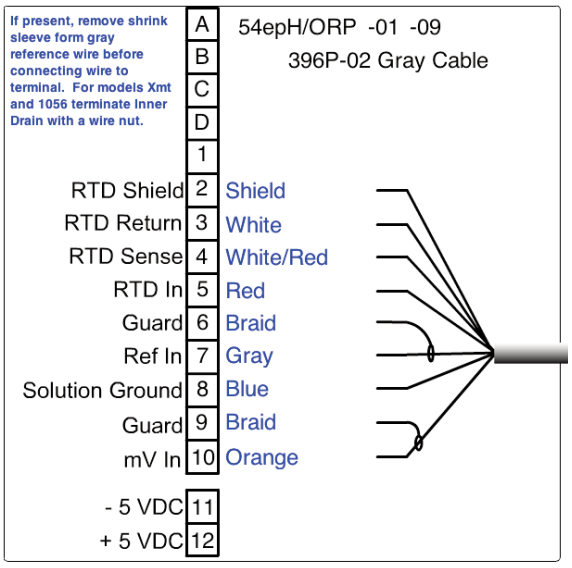


Figure 3-4. Wiring for 396P-02 (Blue Cable) and 54e pH/ORP

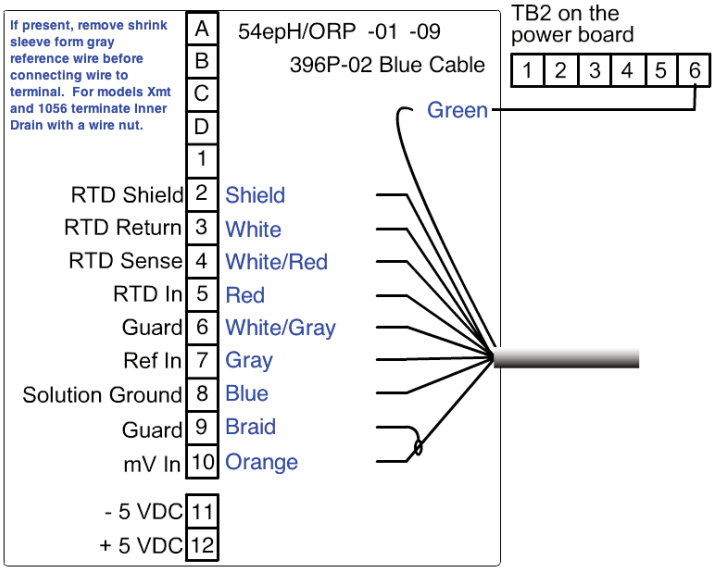


Figure 3-5. Wiring for 396PVP (Gray Cable) and 54e pH/ORP

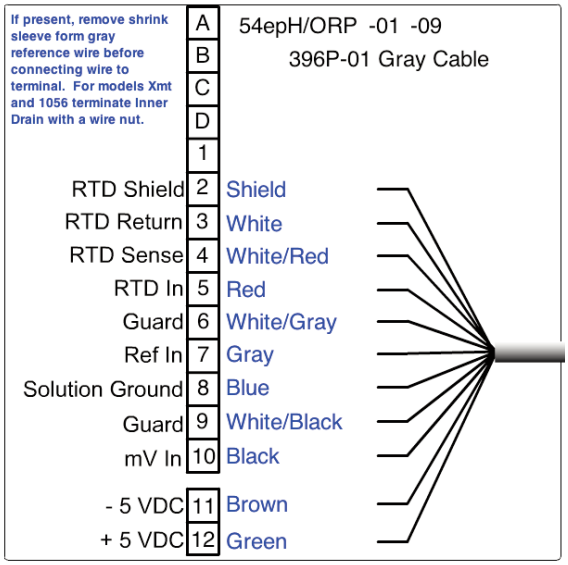


Figure 3-6. Wiring for 396PVP (Blue Cable) and 54e pH/ORP

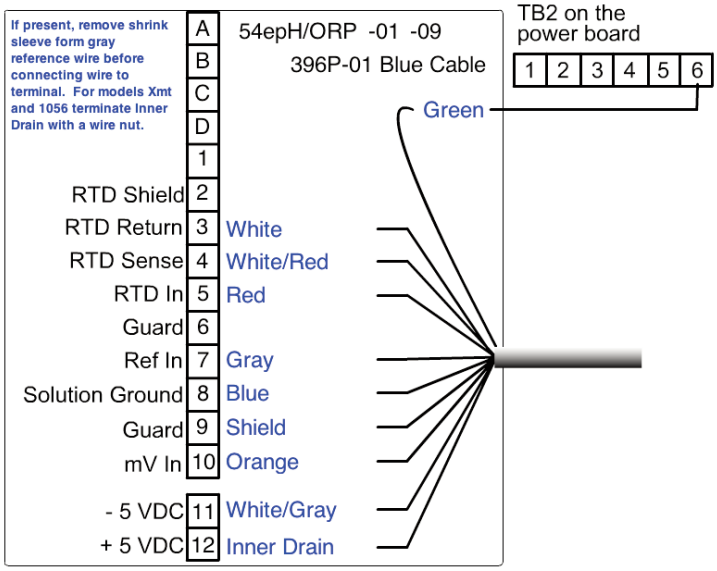


Figure 3-7. Wiring for 396P-01 and 1055

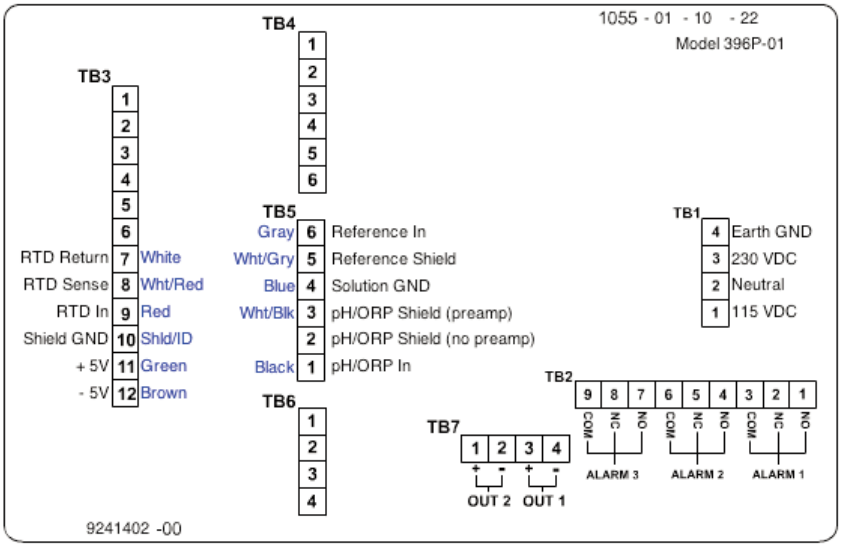


Figure 3-8. Wiring for 396P-02 and 1055

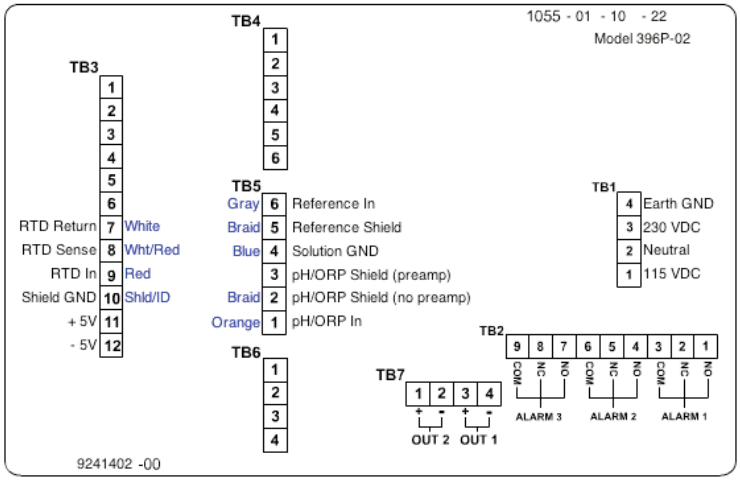


Figure 3-9. Wiring for 396PVP and 1055

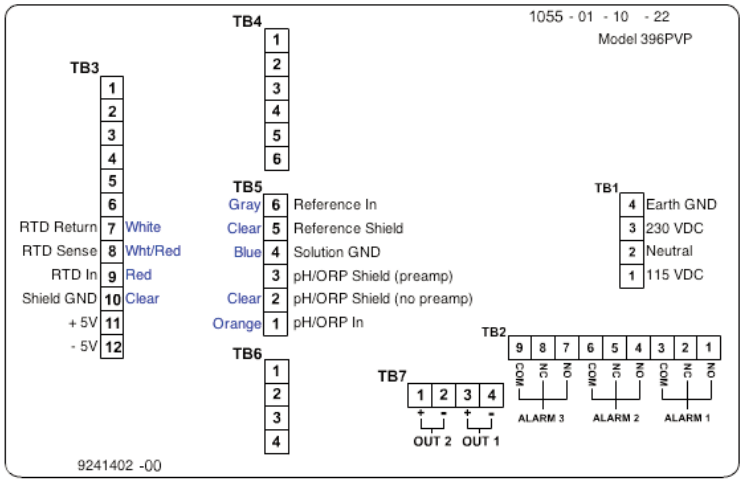


Figure 3-10. Wiring for Dual 396P-01 and 1055

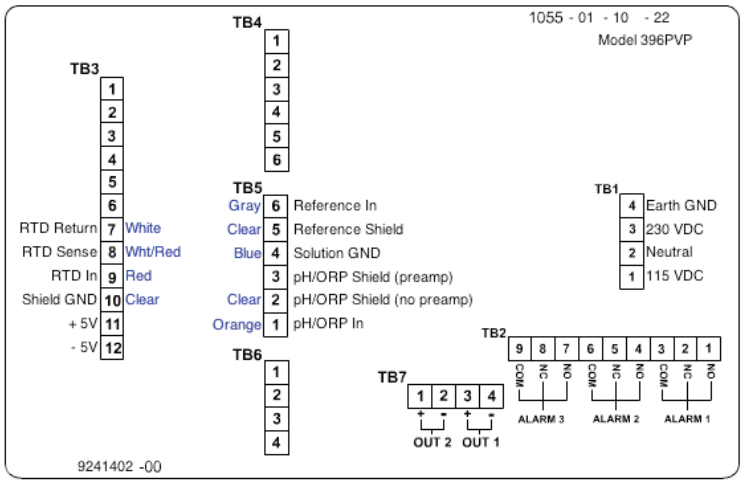


Figure 3-11. Wiring for Dual 396P-02 and 1055

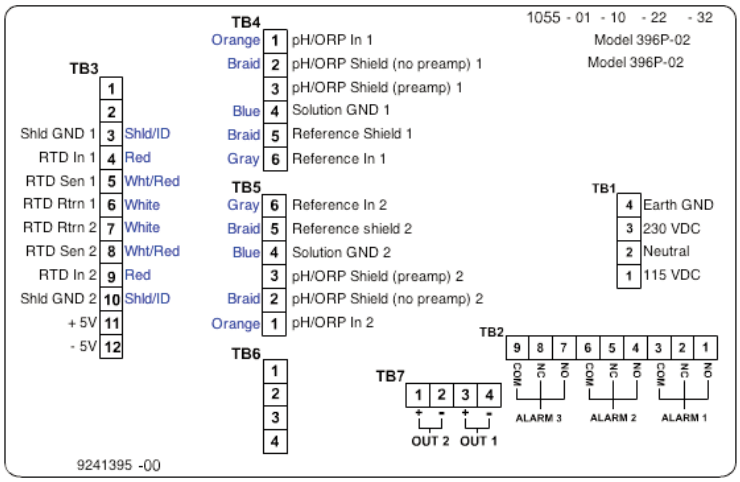


Figure 3-12. Wiring for Dual 396PVP and 1055

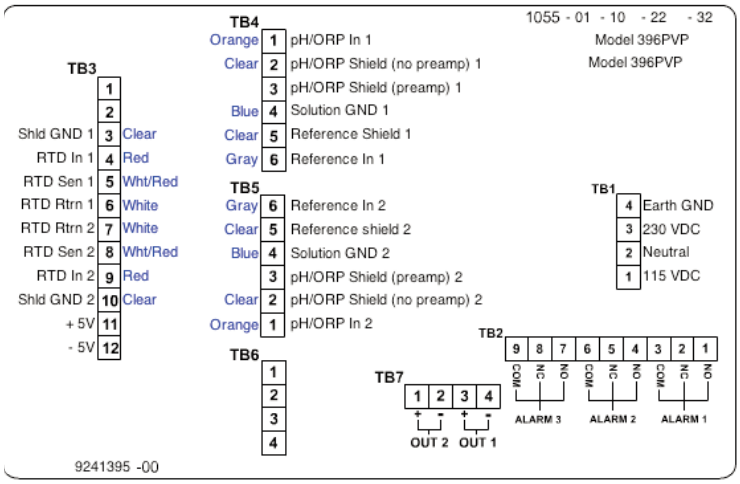
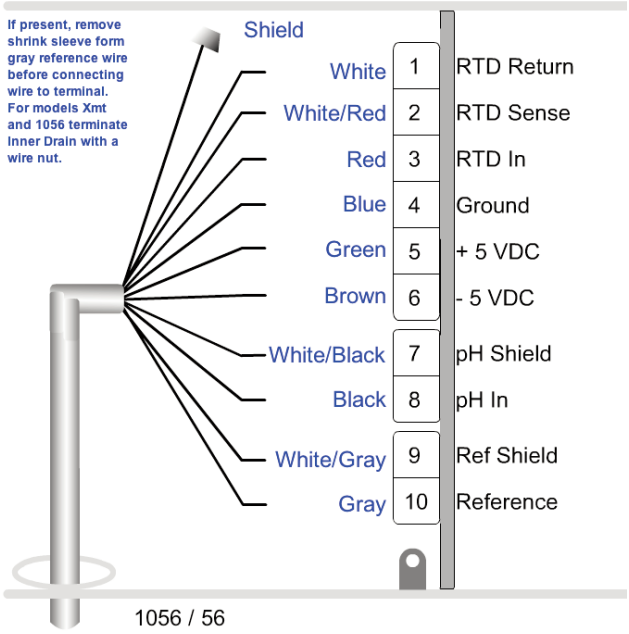
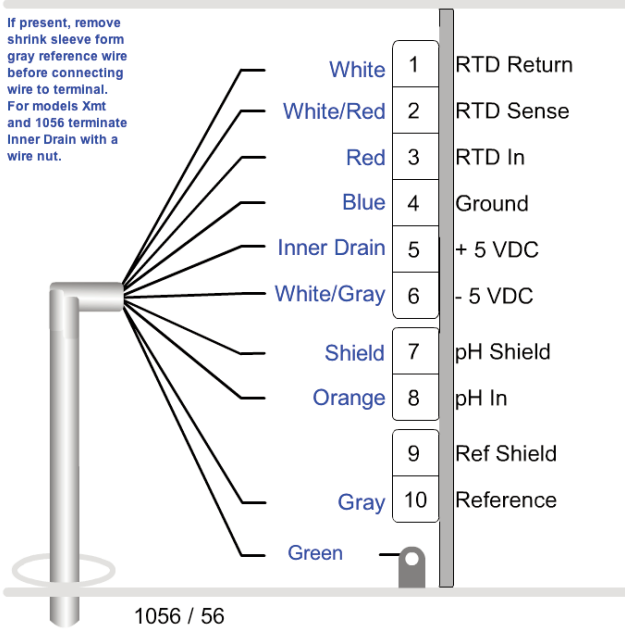


Figure 3-13. Wiring for 396P-01 (Gray Cable) and 1056/56



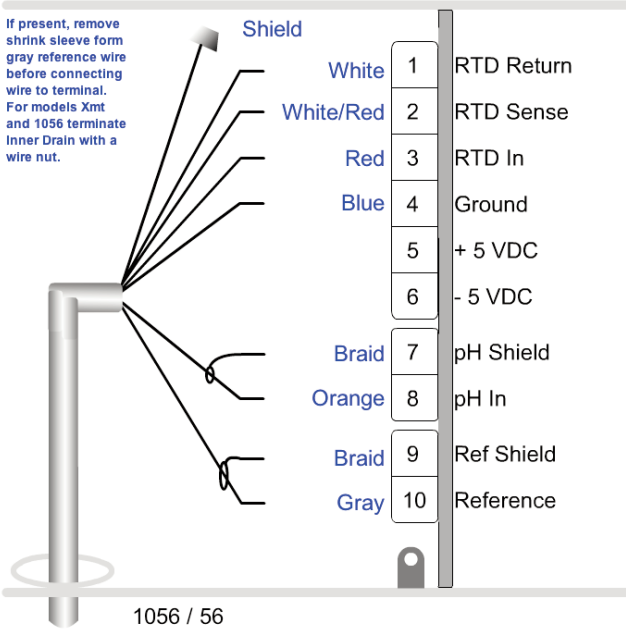
1056 / 56
396P-01 Gray Cable

Figure 3-14. Wiring for 396P-01 (Blue Cable) and 1056/56



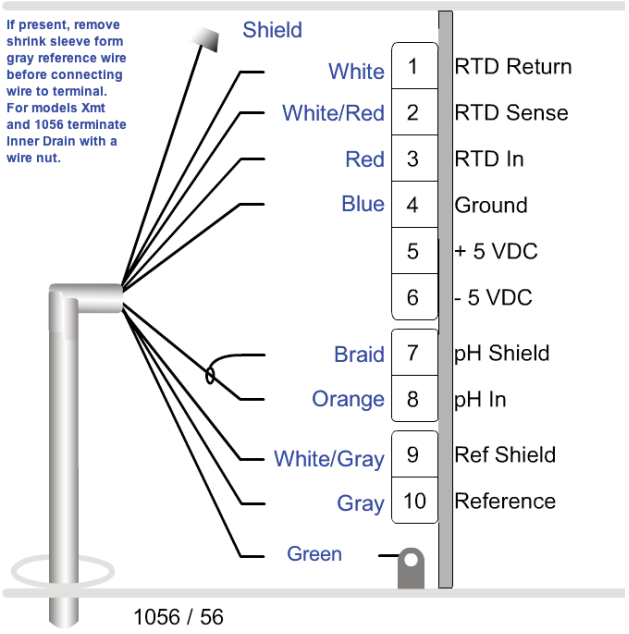
1056 / 56
396P-01 Blue Cable

Figure 3-15. Wiring for 396P-02 (Gray Cable) and 1056/56



1056 / 56
396P-02 Gray Cable

Figure 3-16. Wiring for 396P-02 (Blue Cable) and 1056/56



1056 / 56
396P-02 Blue Cable

Figure 3-17. Wiring for 396PVP (Gray Cable) and 1056/56

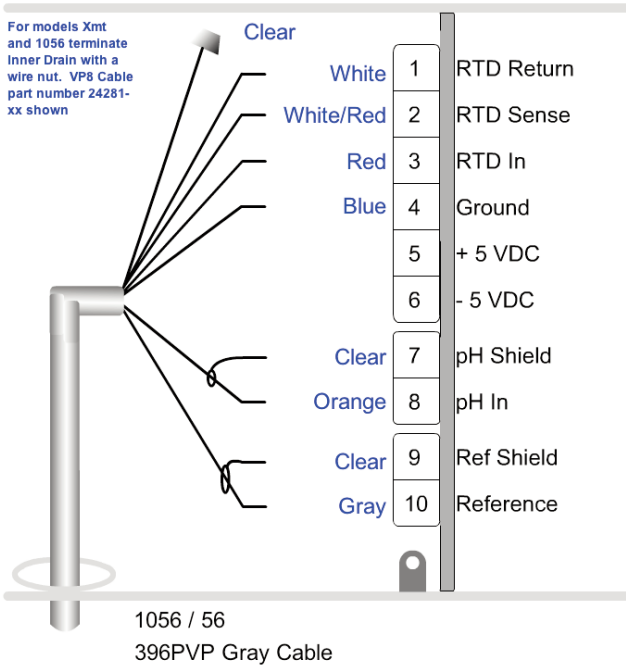


Figure 3-18. Wiring for 396P-01 (Blue Cable) and 1056/56

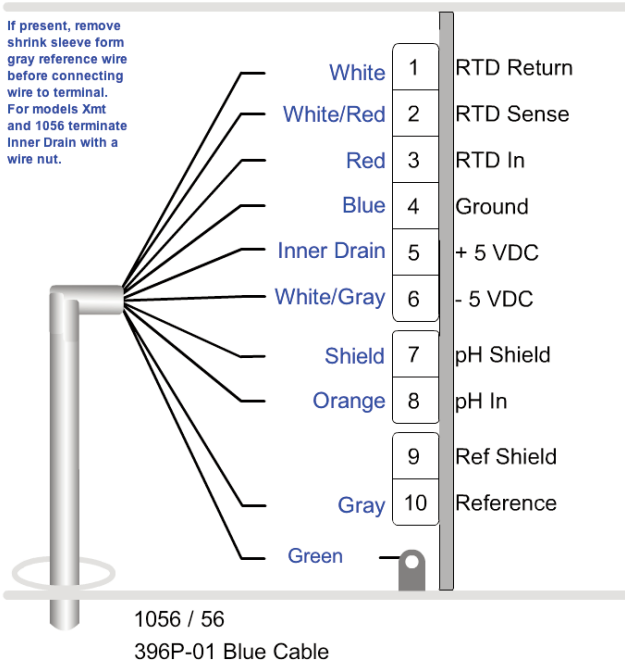


Figure 3-19. Wiring for 396VP-70 (Blue Cable) and 1056/1057/56

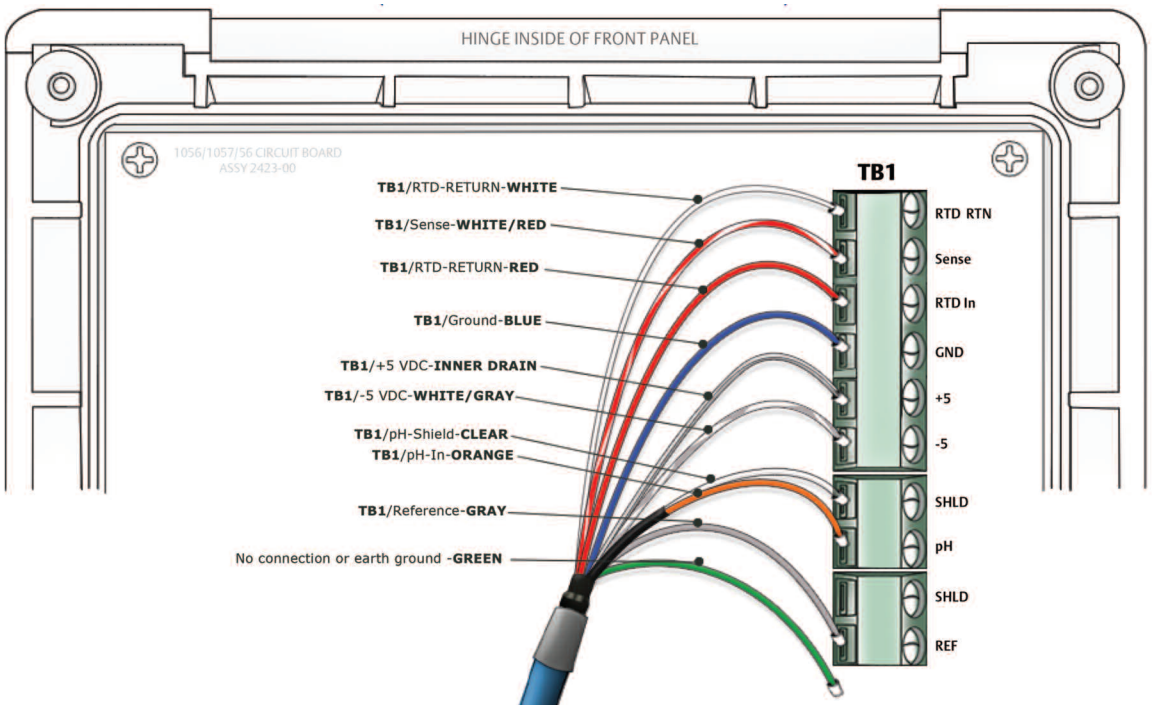
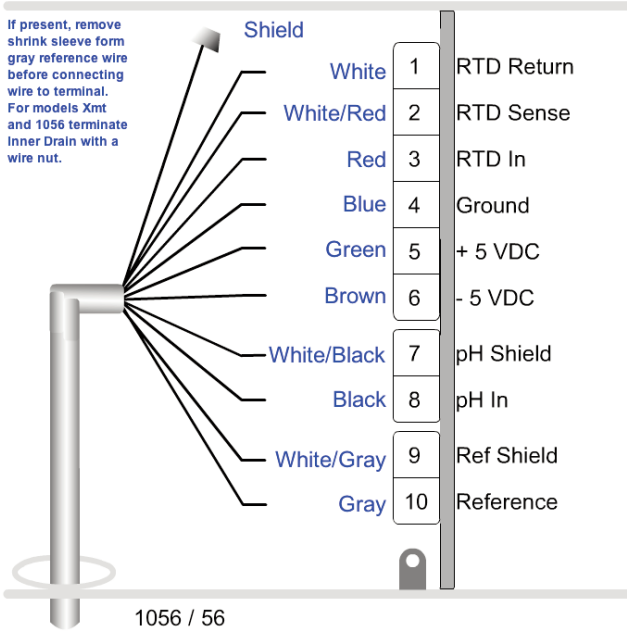
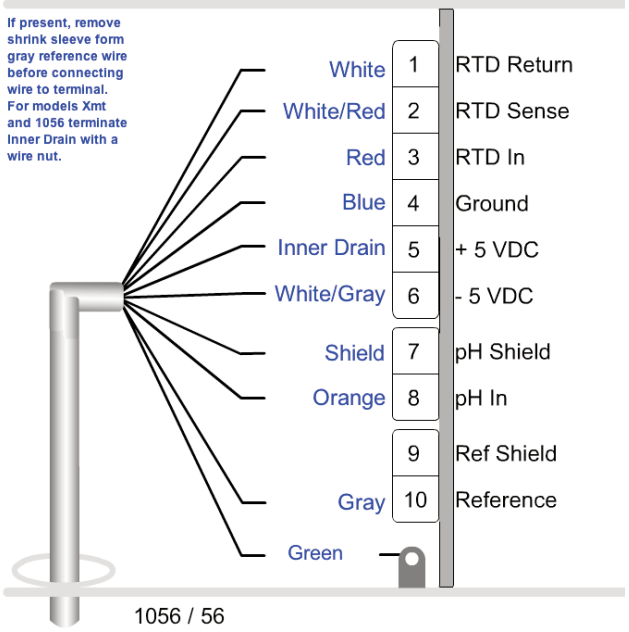


Figure 3-20. Wiring for 396P-01 (Gray Cable) and 1057



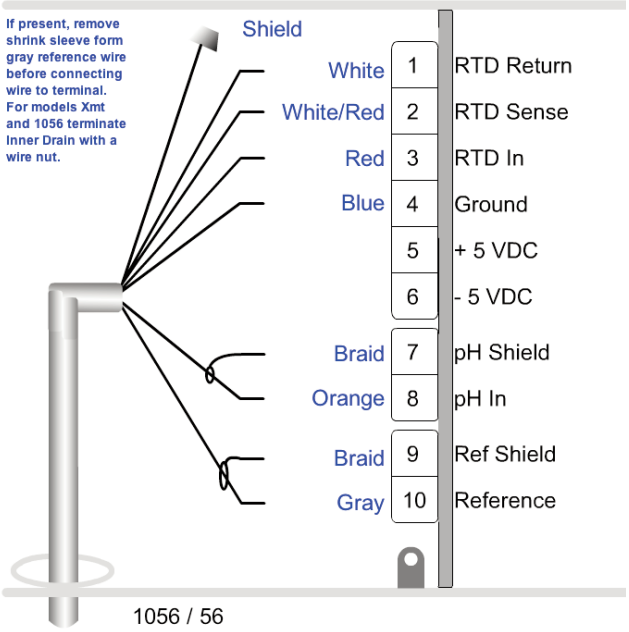
1056 / 56
396P-01 Gray Cable

Figure 3-21. Wiring for 396P-01 (Blue Cable) and 1057



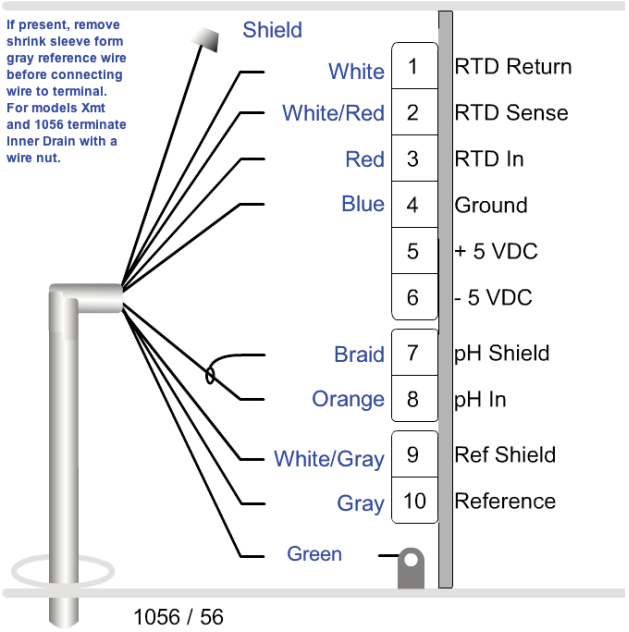
1056 / 56
396P-01 Blue Cable

Figure 3-22. Wiring for 396P-02 (Gray Cable) and 1057



1056 / 56
396P-02 Gray Cable

Figure 3-23. Wiring for 396P-02 (Blue Cable) and 1057



1056 / 56
396P-02 Blue Cable

Figure 3-24. Wiring for 396PVP (Gray Cable) and 1057

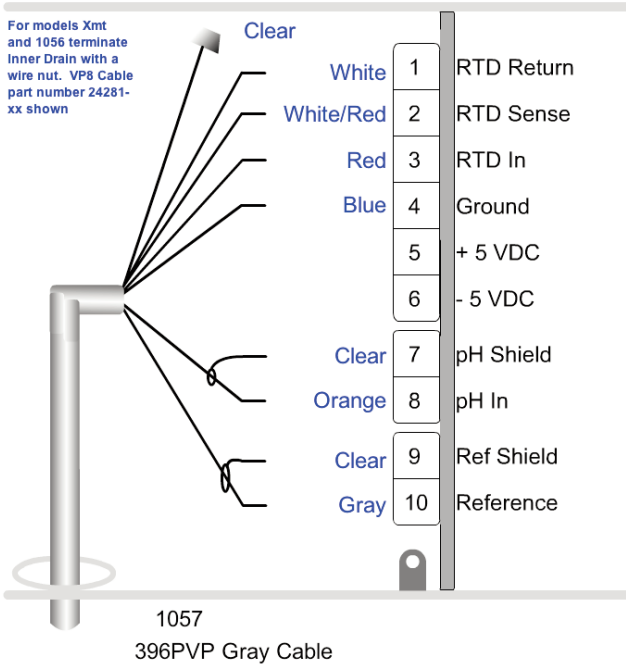


Figure 3-25. Wiring for 396PVP (Blue Cable) and 1057

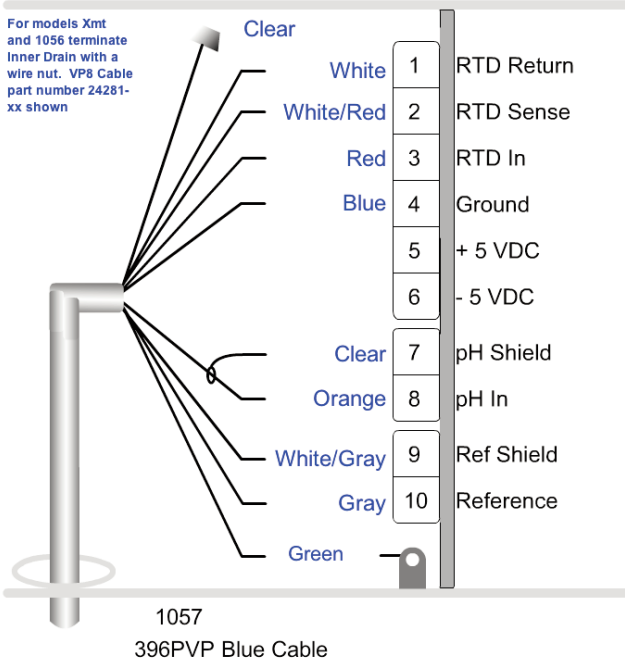


Figure 3-26. Wiring for 396P-01 and 1066

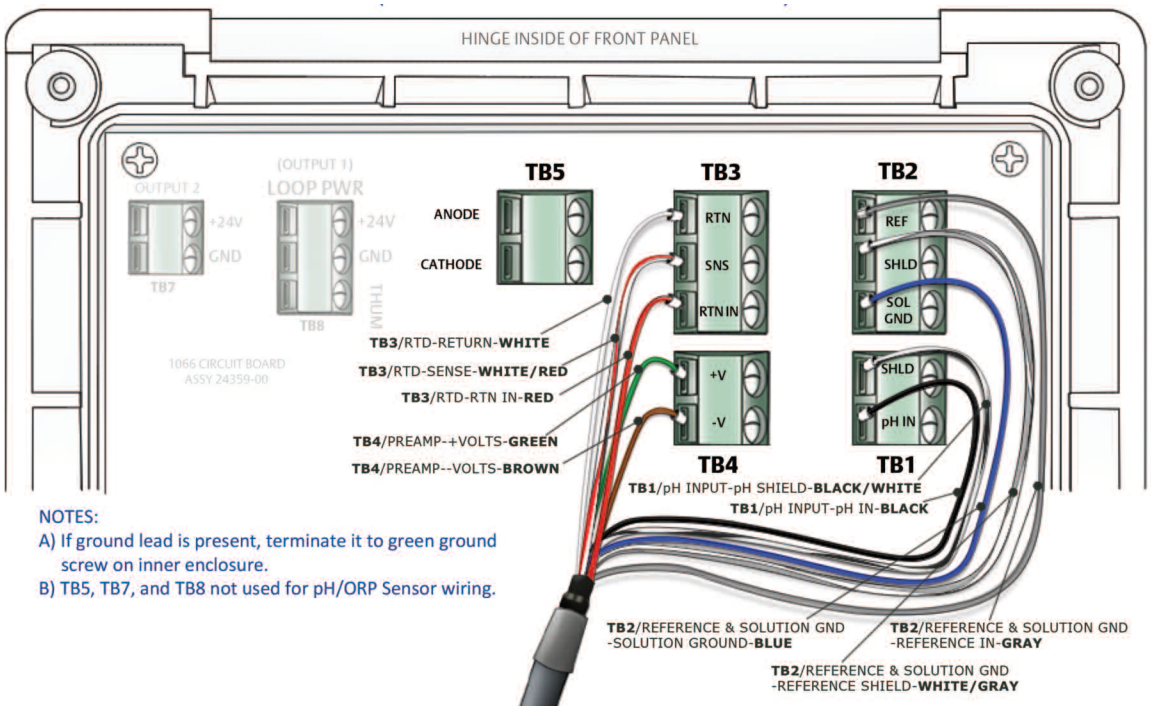


Figure 3-27. Wiring for 396P-01 (Blue Cable) and 1066

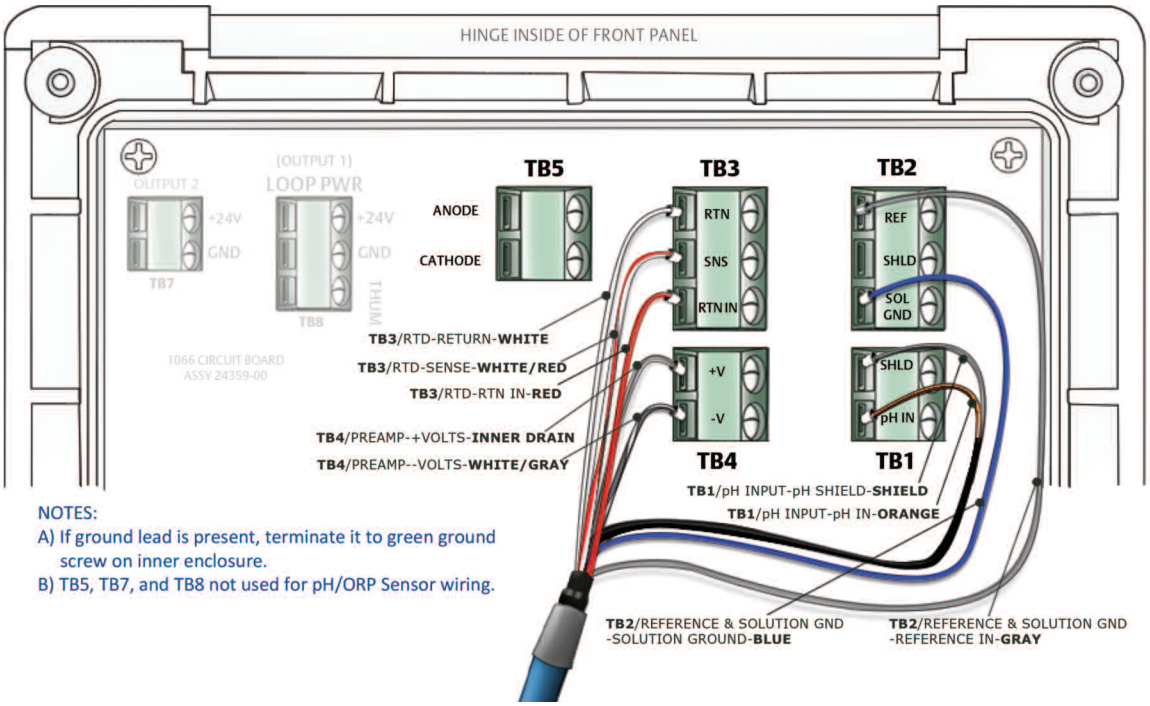


Figure 3-28. Wiring for 396P-02 and 1066

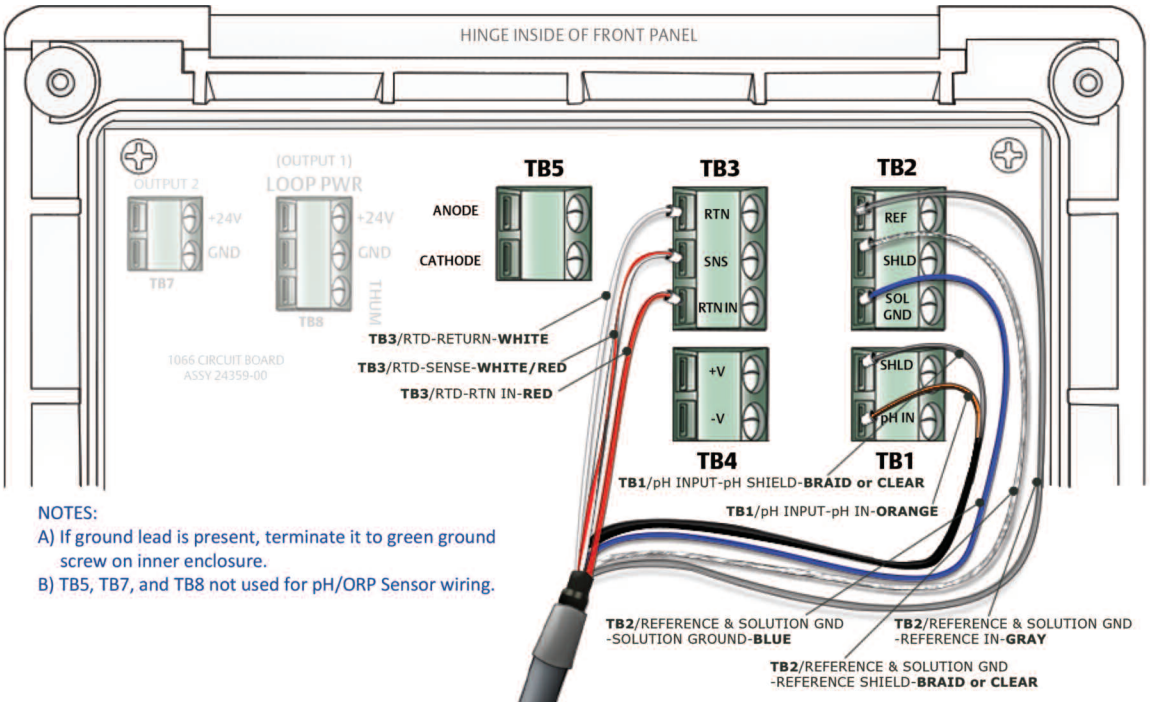


Figure 3-29. Wiring for 396P-02 (Blue Cable) and 1066

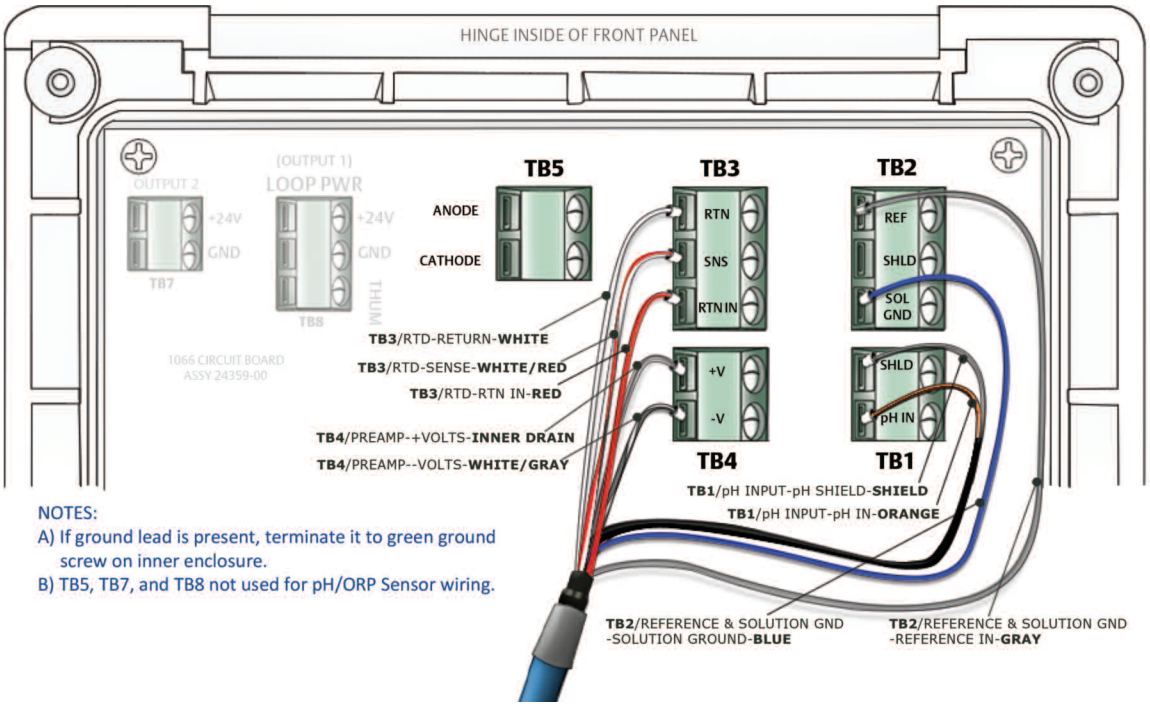


Figure 3-30. Wiring for 396PVP and 1066

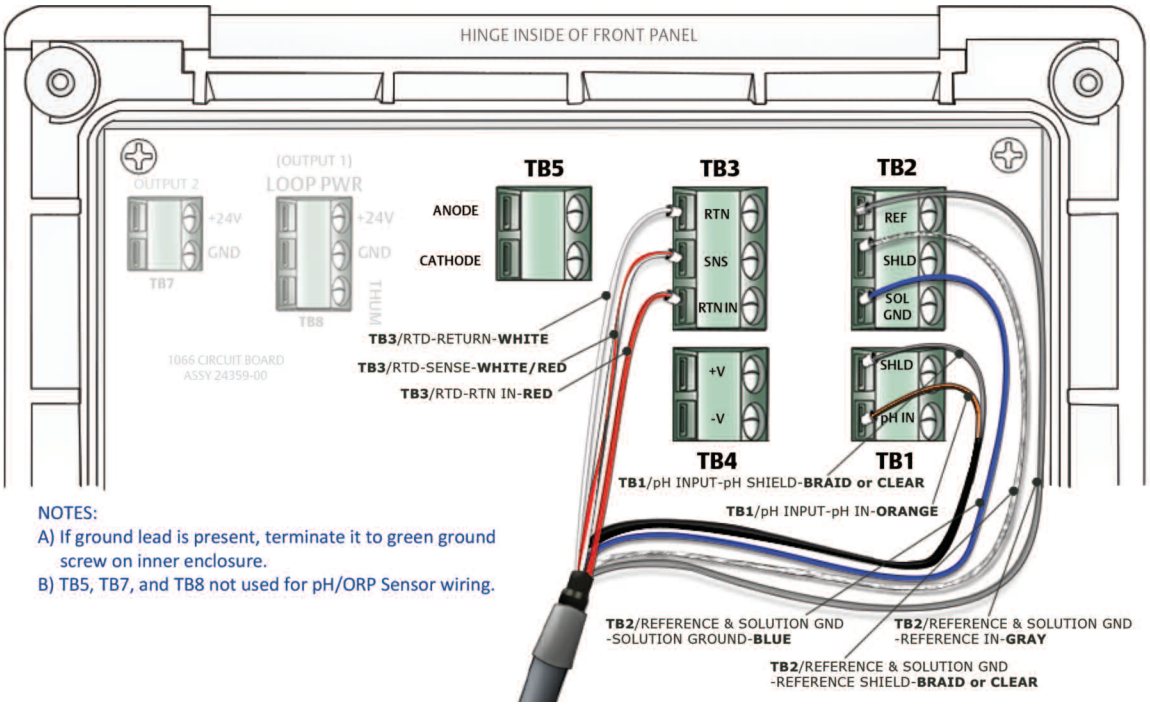


Figure 3-31. Wiring for 396PVP (Blue Cable) and 1066

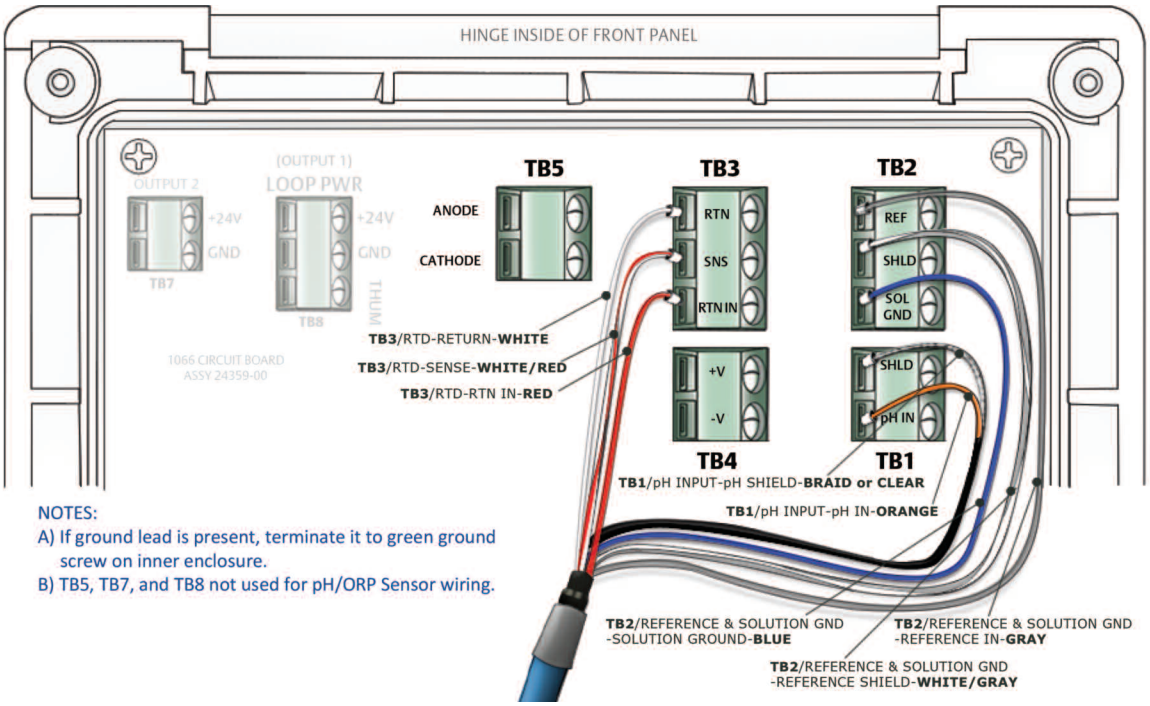


Figure 3-32. Wiring for 396PVP-70 (Blue Cable) and 1066

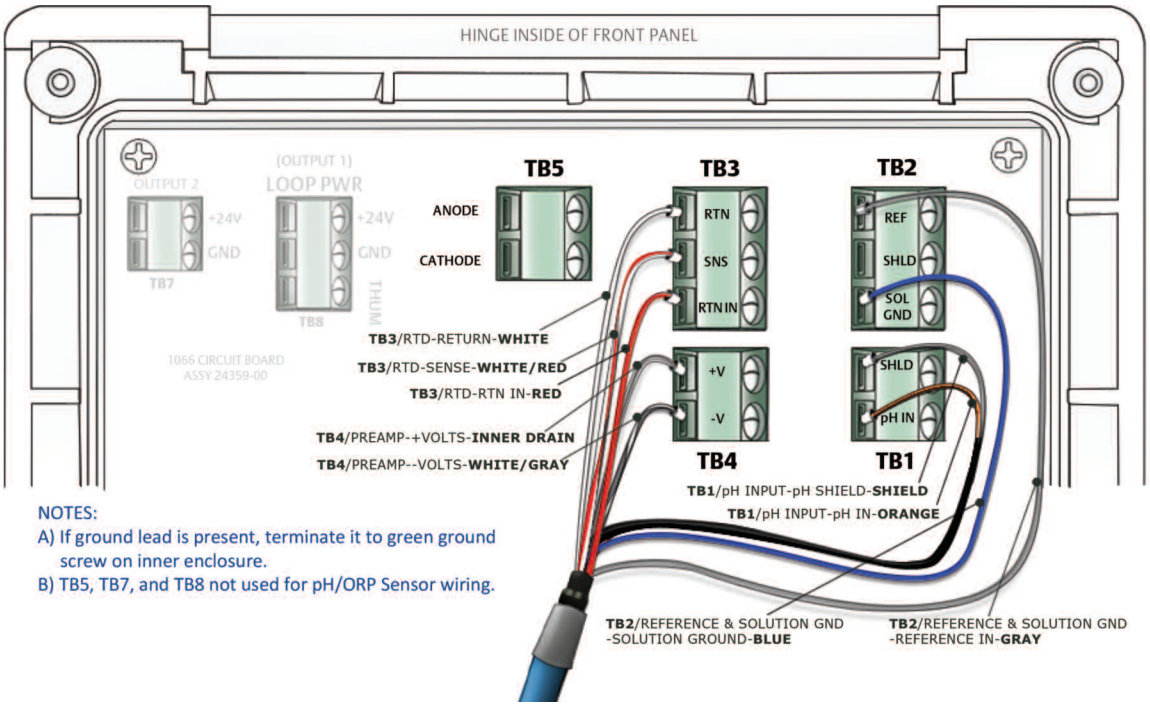


Figure 3-33. Wiring for 396P-01 (Gray Cable) and 5081-P-HT

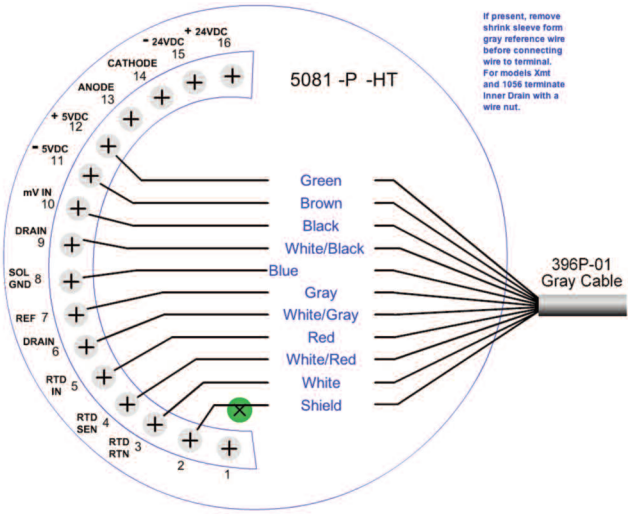


Figure 3-34. Wiring for 396P-01 (Blue Cable) and 5081-P-HT

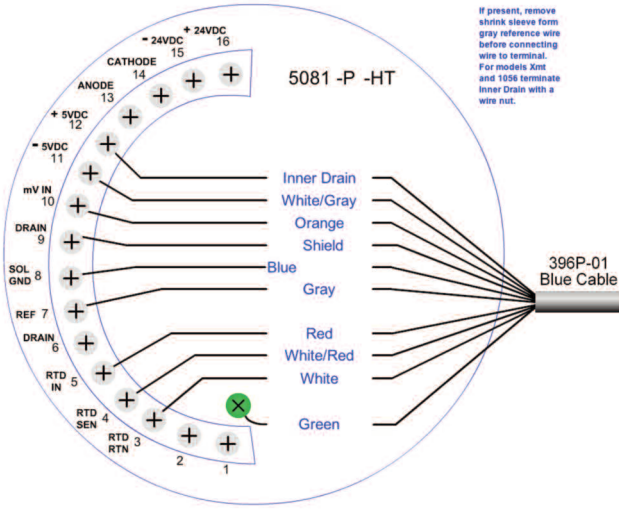


Figure 3-35. Wiring for 396P-02 (Gray Cable) and 5081-P-HT

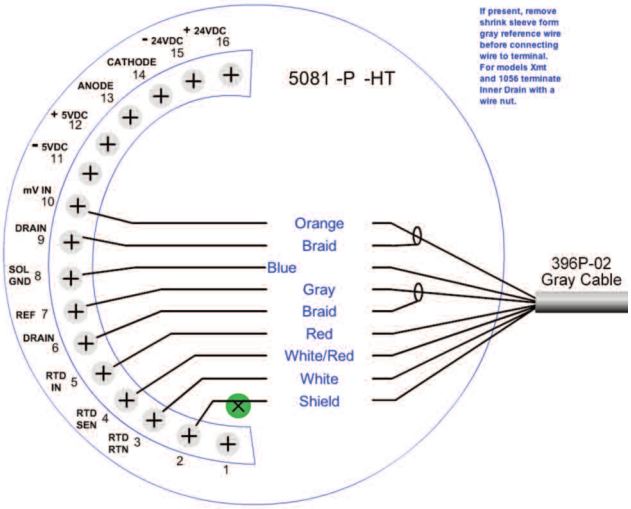


Figure 3-36. Wiring for 396P-02 (Blue Cable) and 5081-P-HT

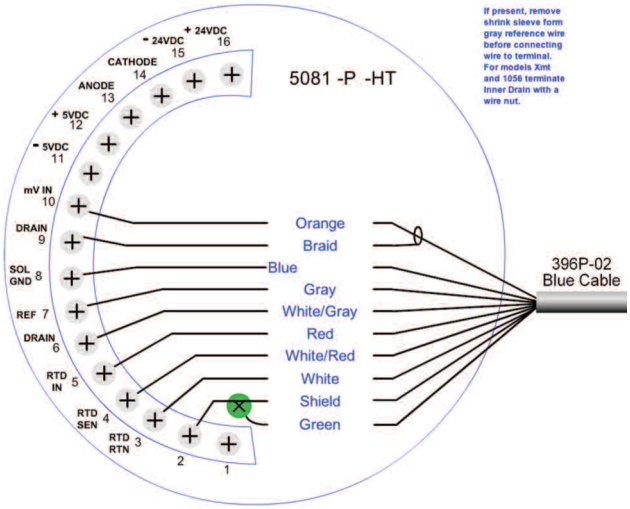


Figure 3-37. Wiring for 396PVP (Gray Cable) and 5081-P-HT

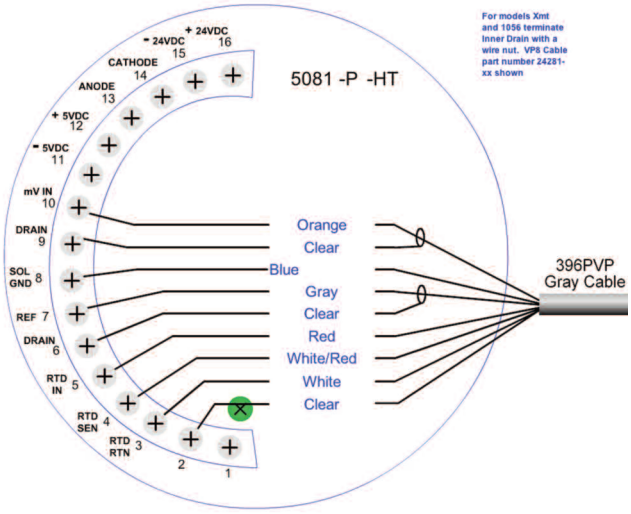


Figure 3-38. Wiring for 396PVP (Blue Cable) and 5081-P-HT

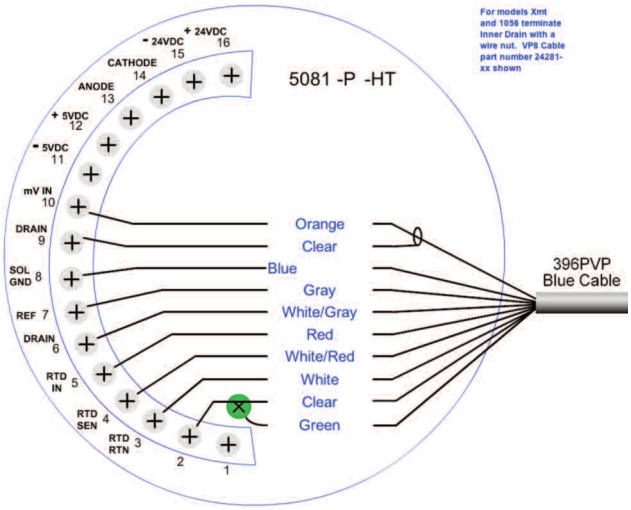


Figure 3-39. Wiring for 396PVP-70 (Gray Cable) and 5081

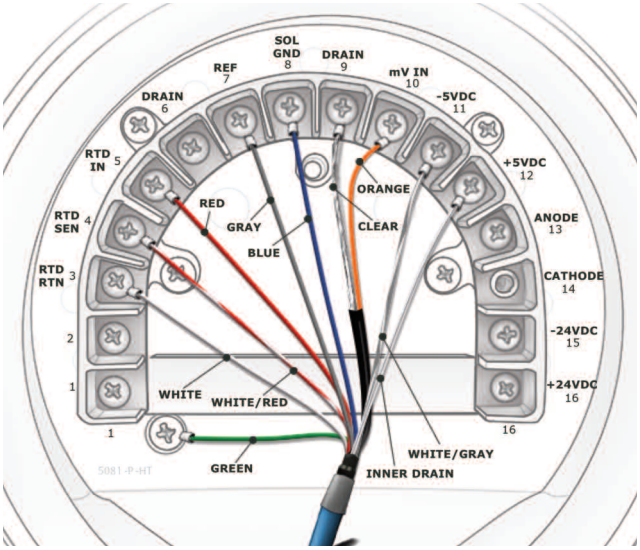


Figure 3-40. Wiring for 396PVP-70 (Gray Cable) and 6081

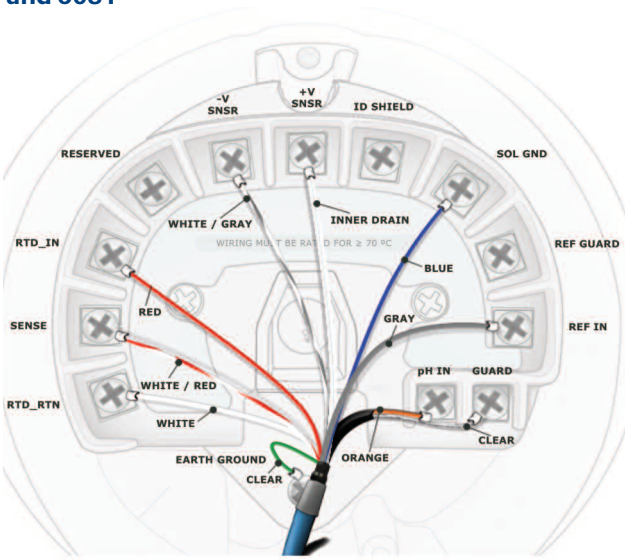


Figure 3-41. Wiring for 396P-01 (Gray Cable) and 6081

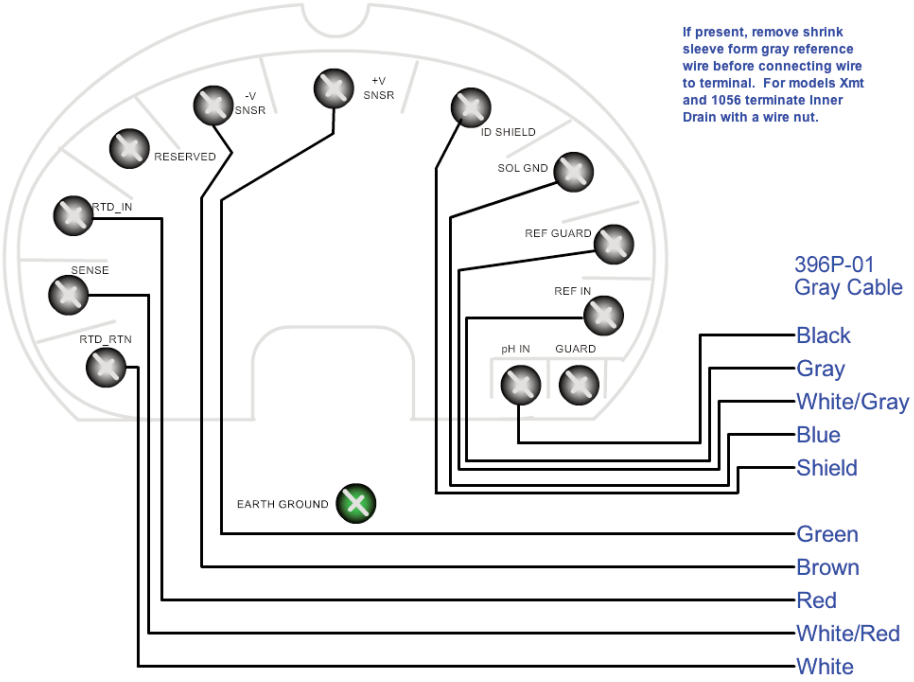


Figure 3-42. Wiring for 396P-01 (Gray Cable) and 6081

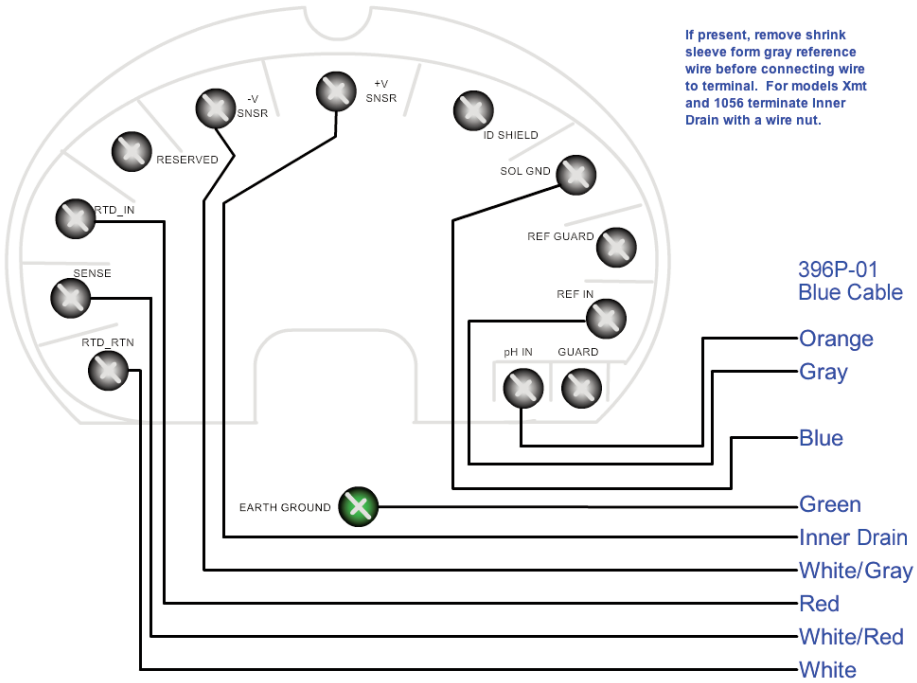


Figure 3-43. Wiring for 396P-02 (Gray Cable) and 6081

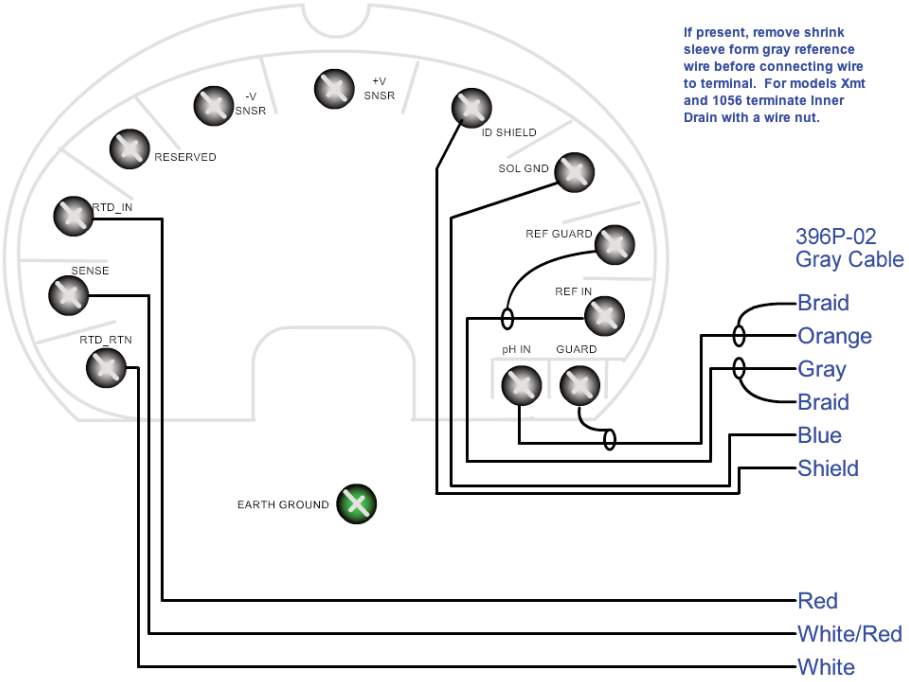


Figure 3-44. Wiring for 396P-02 (Blue Cable) and 6081

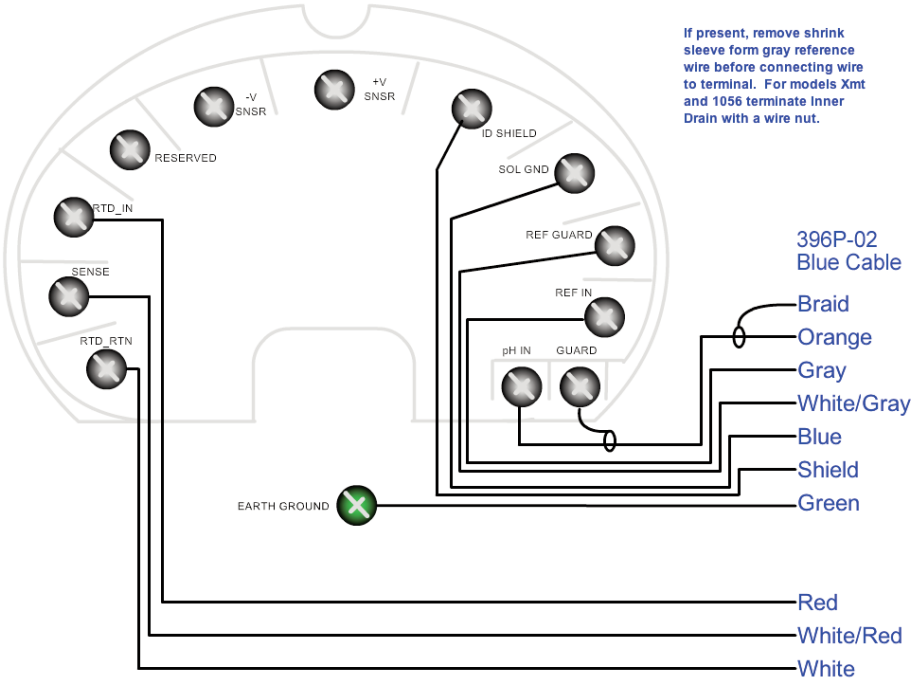


Figure 3-45. Wiring for 396PVP (Gray Cable) and 6081

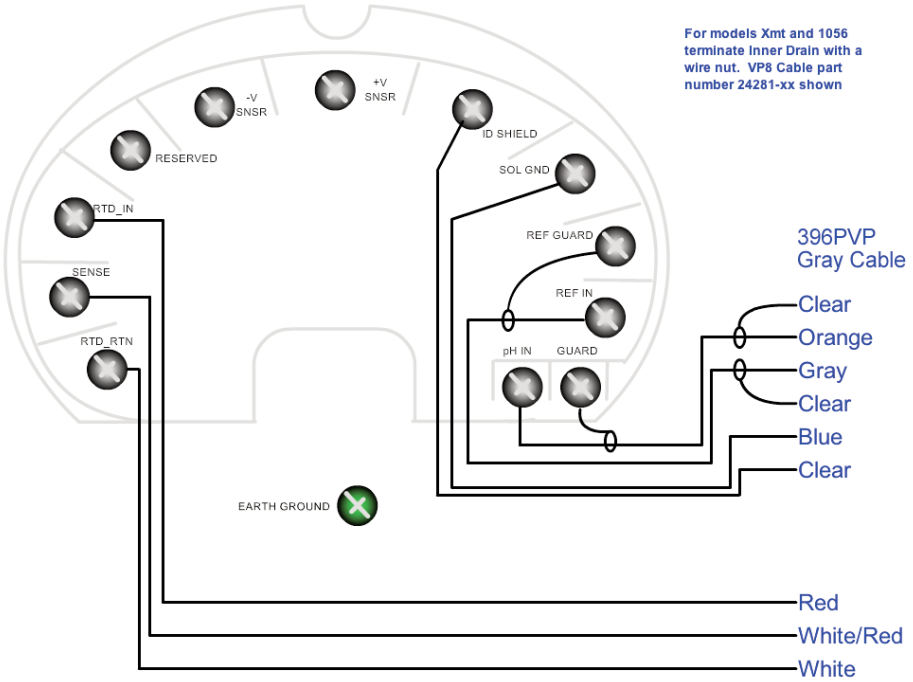


Figure 3-46. Wiring for 396PVP (Blue Cable) and 6081

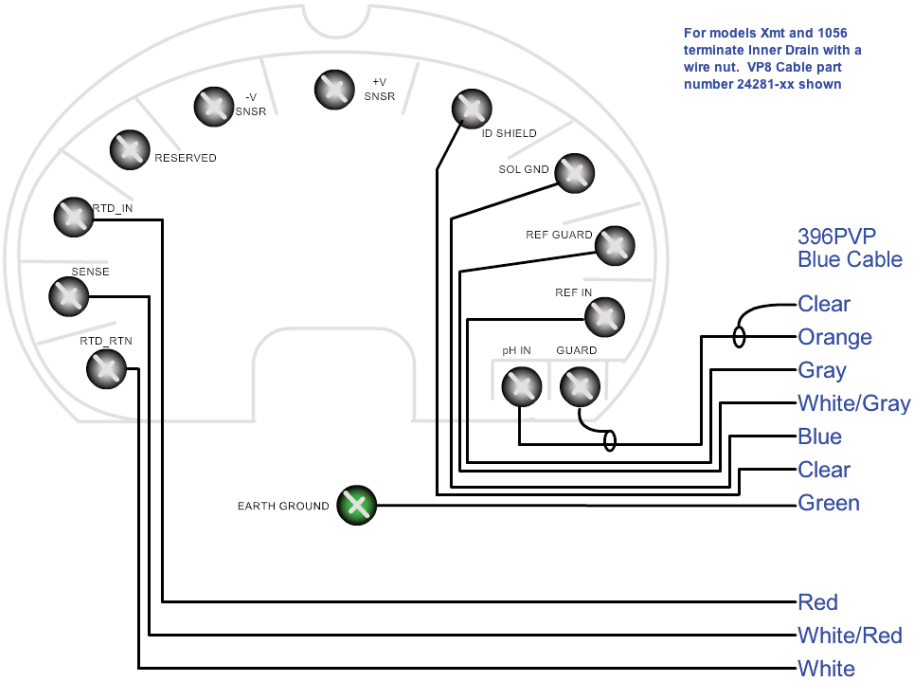


Figure 3-47. Wiring for 396P-01 (Gray Cable) and Xmt

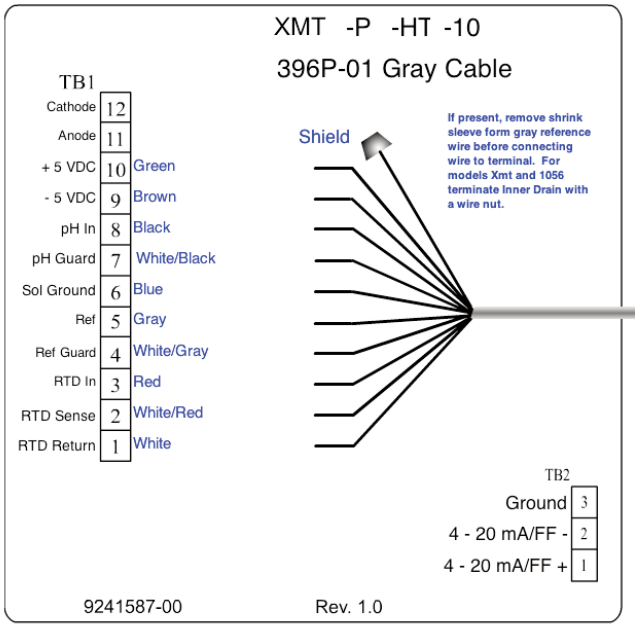


Figure 3-48. Wiring for 396P-01 (Blue Cable) and Xmt

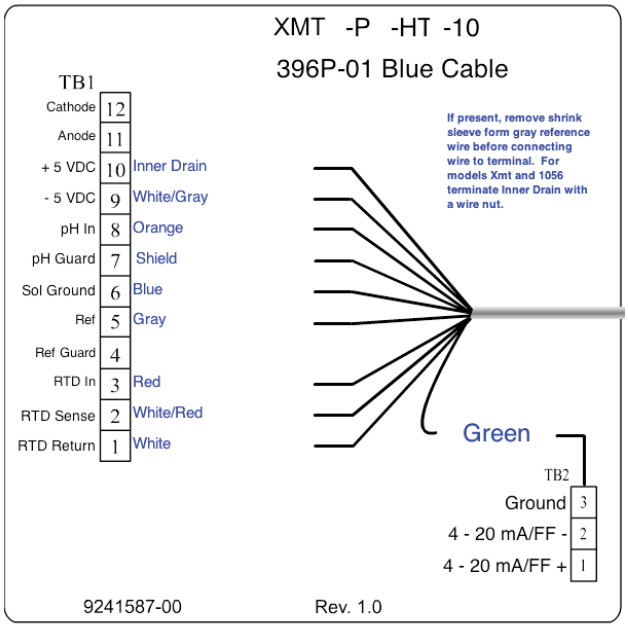


Figure 3-49. Wiring for 396P-02 (Gray Cable) and Xmt

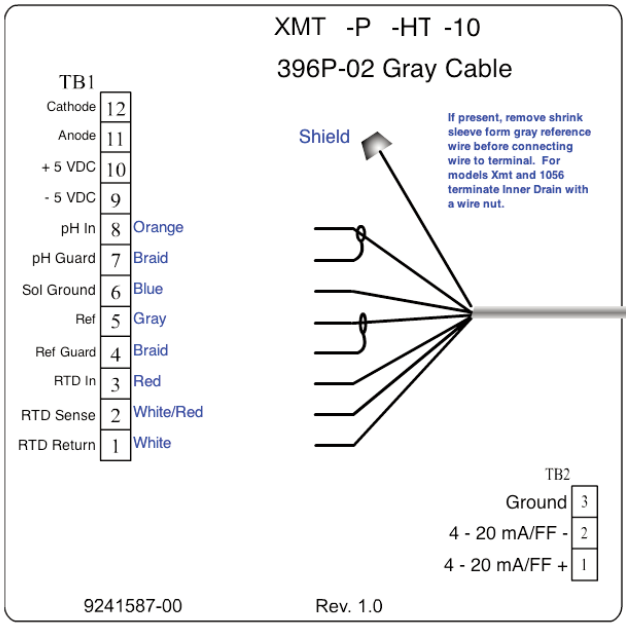


Figure 3-50. Wiring for 396P-02 (Blue Cable) and Xmt

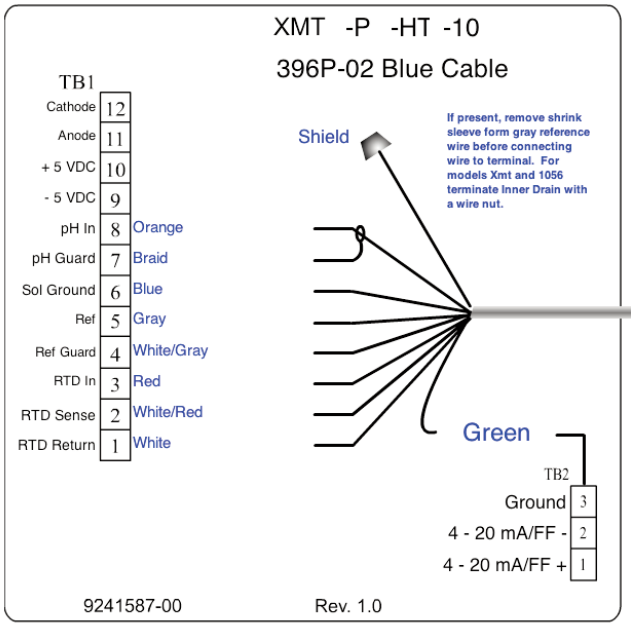


Figure 3-51. Wiring for 396PVP (Gray Cable) and Xmt

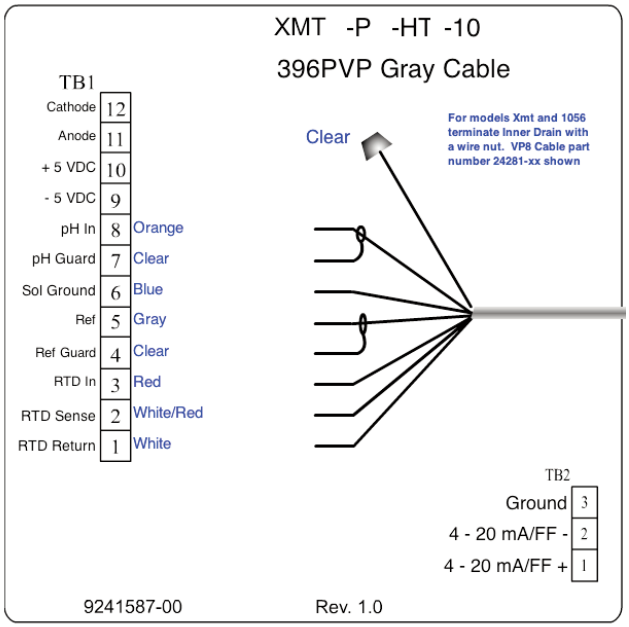


Figure 3-52. Wiring for 396PVP (Blue Cable) and Xmt

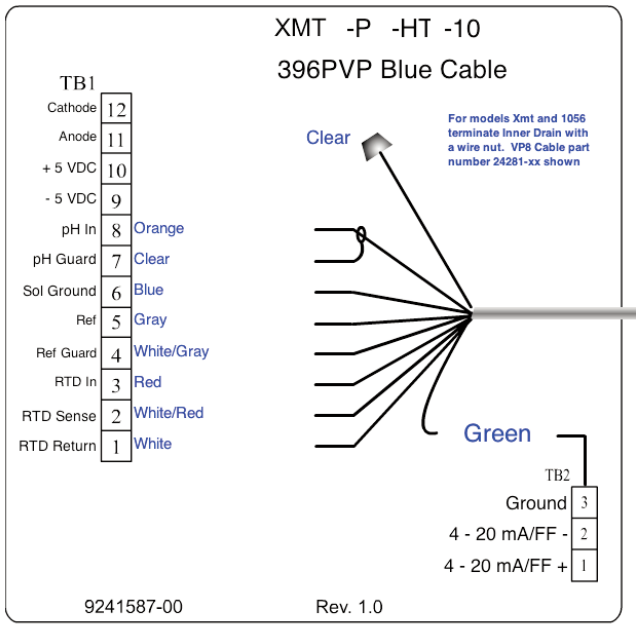
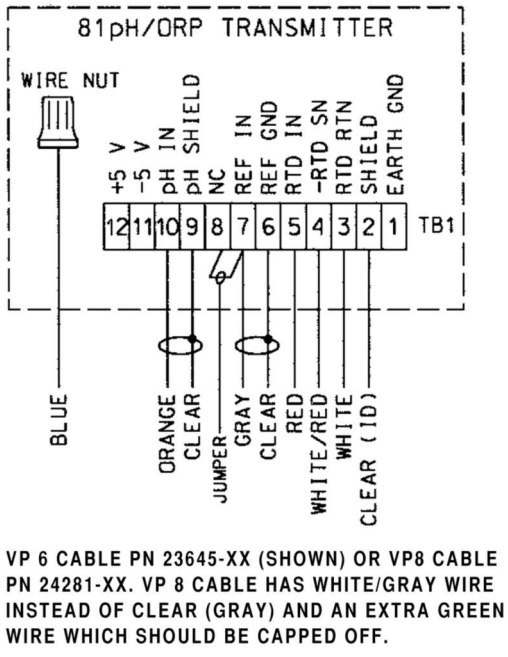


Figure 3-53. Wiring Details for 396PVP or 396P-02-55 with Mating Variopol Cable for use with 81



VP 6 CABLE PN 23645-XX (SHOWN) OR VP8 CABLE PN 24281-XX. VP 8 CABLE HAS WHITE/GRAY WIRE INSTEAD OF CLEAR (GRAY) AND AN EXTRA GREEN WIRE WHICH SHOULD BE CAPPED OFF.

Figure 3-54. Wiring Details for 396PVP or 396P-02-50 with Mating Variopol Cable for use with 1181

VP 6 CABLE PN 23645-XX (SHOWN) OR VP8 CABLE PN 24281-XX. VP 8 CABLE HAS WHITE/GRAY WIRE INSTEAD OF CLEAR (GRAY) AND AN EXTRA GREEN WIRE WHICH SHOULD BE CAPPED OFF.

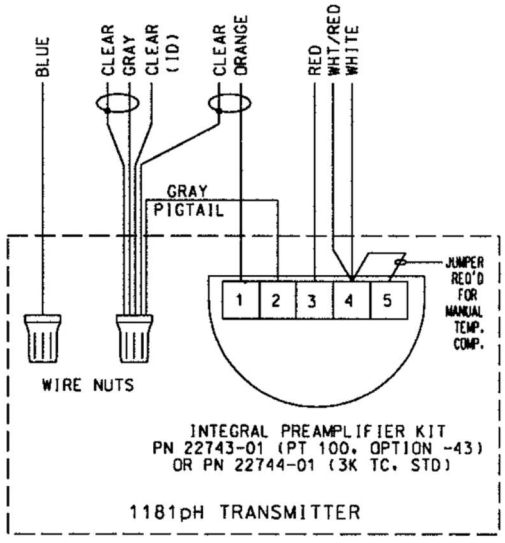
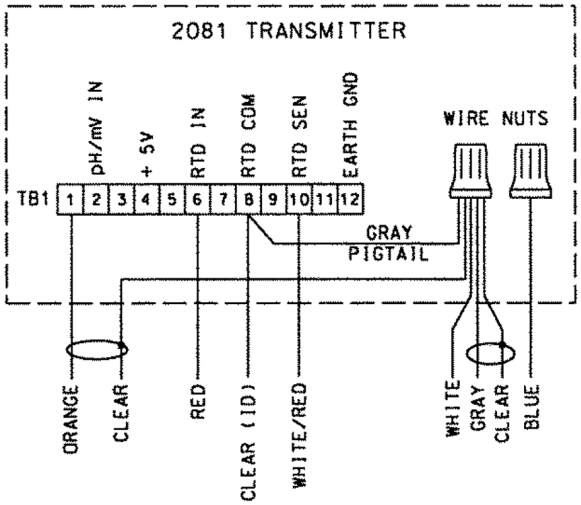
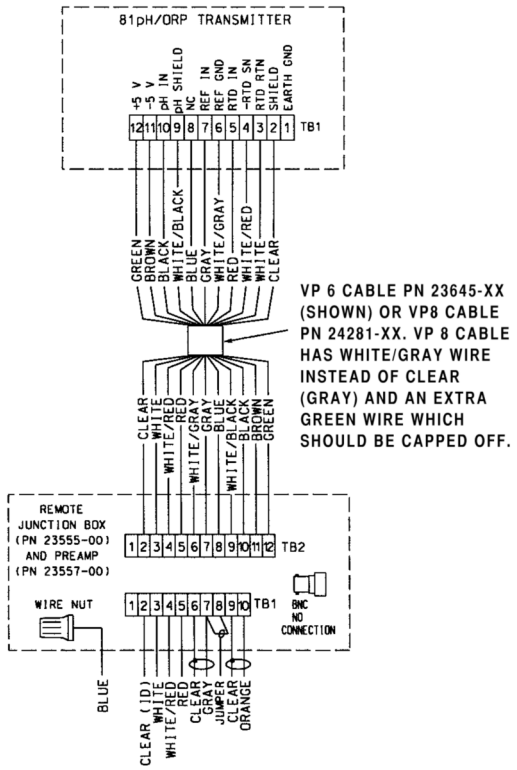


Figure 3-55. Wiring Details for 396PVP or 396P-02-54 with Mating Variopol Cable for use with 2081



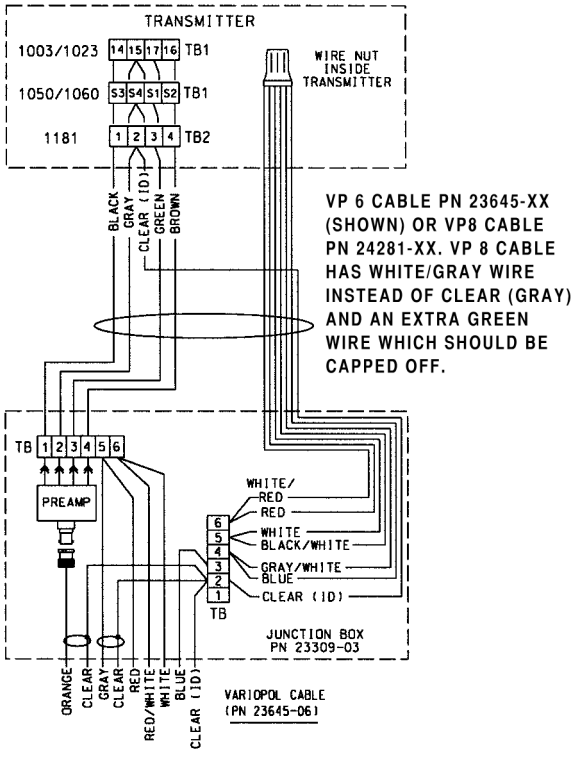
VP 6 CABLE PN 23645-XX (SHOWN) OR VP8 CABLE PN 24281-XX. VP 8 CABLE HAS WHITE/GRAY WIRE INSTEAD OF CLEAR (GRAY) AND AN EXTRA GREEN WIRE WHICH SHOULD BE CAPPED OFF.

Figure 3-56. Wiring Details for 396PVP or 396P-02-55 with Mating Variopol Cable for use with Remote Junction Box (PN 23555-00) to 81



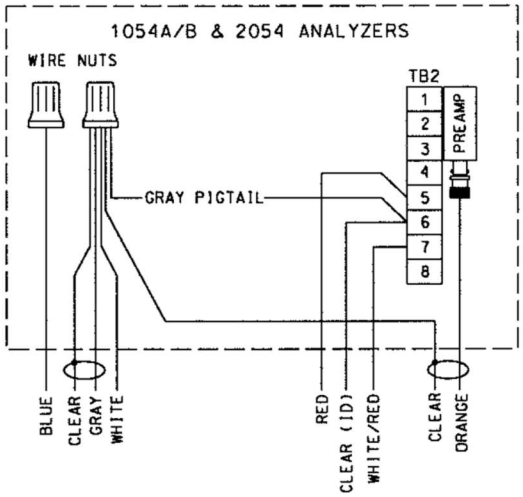
VP 6 CABLE PN 23645-XX (SHOWN) OR VP8 CABLE PN 24281-XX. VP 8 CABLE HAS WHITE/GRAY WIRE INSTEAD OF CLEAR (GRAY) AND AN EXTRA GREEN WIRE WHICH SHOULD BE CAPPED OFF.

Figure 3-57. Wiring Details for 396PVP or 396P-02-50 with Mating Variopol Cable for use with Remote Junction Box (PN 23309-03) to 1181



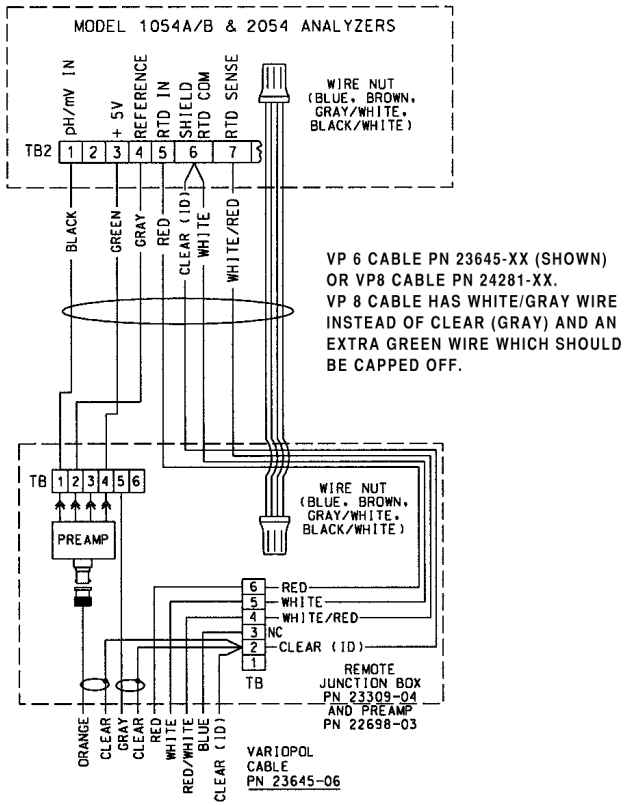
VP 6 CABLE PN 23645-XX (SHOWN) OR VP8 CABLE PN 24281-XX. VP 8 CABLE HAS WHITE/GRAY WIRE INSTEAD OF CLEAR (GRAY) AND AN EXTRA GREEN WIRE WHICH SHOULD BE CAPPED OFF.

Figure 3-58. Wiring Details for 396PVP or 396P-02-54 with Mating Variopol Cable for use with 1054A/B & 2054



VP 6 CABLE PN 23645-XX (SHOWN) OR VP8 CABLE PN 24281-XX.
VP 8 CABLE HAS WHITE/GRAY WIRE INSTEAD OF CLEAR (GRAY) AND AN EXTRA GREEN WIRE WHICH SHOULD BE CAPPED OFF.

Figure 3-59. Wiring Details for 396PVP or 396P-02-54 with Mating Variopol Cable for use with 1054



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Section 4: Start-Up and Calibration

4.1 396P and 396PVP pH Sensors

4.1.1 Sensor preparation

Shake down the sensor to remove any air bubbles that may be present at the tip of the pH glass bulb. In most cases, the pH sensor can simply be installed as shipped and readings with an accuracy of ± 0.6 pH may be obtained. To obtain greater accuracy or to verify proper operation, the sensor must be calibrated as a loop with its compatible analyzer or transmitter.

4.1.2 pH Calibration

After a temporary connection is established between the sensor and the instrument, a buffer calibration may be performed. Consult appropriate pH/ORP analyzer or transmitter instruction manual for specific calibration and standardization procedures, or see below for recommended two-point buffer calibration procedure.

Recommended two-point buffer calibration procedure:

Select two stable buffer solutions, preferably pH 4.0 and 10.0 (pH buffers other than pH 4.0 and pH 10.0 can be used as long as the pH values are at least two pH units apart).

NOTE: A pH 7.0 buffer solution reads a mV value of approximately zero, and pH buffers read approximately 59.1 mV for each pH unit above or below pH 7.0. Check the pH buffer manufacturer specifications for millivolt values at various temperatures since it may affect the actual value of the buffer solution mV/pH value.

1. Immerse sensor in the first buffer solution. Allow sensor to adjust to the buffer temperature (to avoid errors due to temperature differences between the buffer solution and sensor temperature) and wait for reading to stabilize. Value of buffer can now be acknowledged by analyzer/transmitter.

2. Once the first buffer has been acknowledged by the analyzer/transmitter, rinse the buffer solution off of the sensor with distilled or deionized water.

3. Repeat steps 1 and 2 using the second buffer solution.

4. Once the analyzer/transmitter has acknowledged both buffer solutions, a sensor slope (mV/pH) is established (the slope value can be found within the analyzer/ transmitter).

5. The slope value should read about 59.1 mV/pH for a new sensor and will decrease over time to approximately 47-49 mV/pH. Once the slope reads below the 47-49 mV/pH range, a new sensor should be installed to maintain accurate readings.

Recommended pH Sensor Standardization:

For maximum accuracy, the sensor can be standardized online or with a process grab sample after a buffer calibration has been performed and the sensor has been conditioned to the process. Standardization accounts for the sensor junction potential and other interferences. Standardization will not change the sensor's slope but will simply adjust the analyzer's reading to match that of the known process pH.

1. While obtaining a process solution sample (it is recommended that the sample is taken close to the sensor), record the pH value that is shown on the analyzer/transmitter display.

2. Measure and record the pH of the process solution sample with another temperature compensated, calibrated pH instrument. For best results, standardization should be performed at the process temperature.

3. Adjust the analyzer/transmitter value to the standardized value.

4.2 396P and 396PVP ORP Sensors

4.2.1 Sensor preparation

Most industrial applications have a number of ORP reactions occurring in sequence or simultaneously. There can be several components that are oxidized or reduced by the reagents that are used. Theoretically, the ORP potential is absolute because it is the result of the oxidation-reduction equilibrium. However, the actual measured potential is dependent on many factors, including the condition of the surface of the ORP platinum electrode. Therefore, the sensor should be allowed 1-2 hours to become “conditioned” to the stream when first set-up or after being cleaned.

4.2.2 ORP Calibration

1. Make a temporary electrical connection between the sensor and the instrument.

2. Obtain an ORP standard solution, or a standard solution can also be made quite simply by adding a few crystals of quinhydrone to either pH 4 or pH 7 buffer. Quinhydrone is only slightly soluble therefore a few crystals will be required. (Refer to Section 4.3. for an alternate ORP standard solution).

3. Immerse the sensor in the standard solution. Allow 1-2 minutes for the ORP sensor to stabilize.

4. Adjust the standardize control of the instrument to the solution value shown in Table 5-1 (below) or on the label of the standard solution. The resulting potentials, measured with a clean platinum electrode and saturated KCl/AgCl reference electrode, should be within ±20 millivolts of the value. Solution temperature must be noted to ensure accurate interpretation of results. The ORP value of saturated quinhydrone solution is not stable over long periods of time. Therefore, these standards should be made up fresh each time they are used.

5. Remove the sensor from the buffer, rinse and install in the process.

TABLE 4-1. ORP of Saturated Quinhydrone Solution (In Millivolts)

	pH 4 Solution			pH 7 Solution		
Temp °C	20	25	30	20	25	30
Millivolt Potential	268	264	260	94	87	80

Section 5: Maintenance

5.1 General Information

The 396P and 396PVP Sensors require minimum maintenance. The sensor should be kept clean and free of debris and sediment at all times. The frequency of cleaning by wiping or brushing with a soft cloth or brush is determined by the nature of the solution being measured. The sensor should be removed from the process periodically and checked in buffer solutions.

⚠ DANGER

BEFORE REMOVING THE SENSOR, be absolutely certain that the process pressure is reduced to 0 psig and the process temperature is lowered to a safe level!

If the sensor will not calibrate, refer to your analyzer/ transmitter instruction manual for proper test procedures. If it is determined that the sensor has failed, it

5.2 Automatic Temperature Compensator

The temperature compensator element is temperature sensitive and can be checked with an ohmmeter. Resistance increases with temperature.

The 3K element will read 3000 ohms ±1% at 25°C (77°F) and a Pt100 will read 110 ohms. Resistance varies with temperature for a 3K and Pt100 element and can be determined according to Table 6-2 or the following formula:

$$R_T=R_O [l+R_1 (T-20)]$$

Where R_T = Resistance

T = Temperature in °C

Refer to Table 6-1 for R_O and R_1 values

5.3 396P & 396PVP pH Sensors

5.3.1 Electrode Cleaning

If the electrode is coated or dirty, clean as follows:

1. Remove the sensor from process.
2. Wipe the glass bulb with a soft, clean, lint free cloth or tissue. If this does not remove the dirt or coating, go to Step 3. (Detergents clean oil and grease; acids remove scale.)
3. Wash the glass bulb in a mild detergent solution and rinse it in clean water. If this does not clean the glass bulb, go to Step 4.

⚠ CAUTION

The solution used during the following check is an acid and should be handled with care. Follow the directions of the acid manufacturer. Wear the proper protective equipment. Do not let the solution come in contact with skin or clothing. If contact with skin is made, immediately rinse with clean water.

4. Wash the glass bulb in a dilute 5% hydrochloric acid solution and rinse with clean water. Soaking the sensor overnight in the acid solution can improve cleaning action.

NOTE: Erroneous pH results may result immediately after acid soak, due to reference junction potential build-up. Replace the sensor if cleaning does not restore sensor operation.

TABLE 5-1. Ro and R1 Values for Temperature Compensation Elements

Temperature Compensation Element	R_o	R_1
3K	2934	.0045
Pt100	107.7	.00385

TABLE 5-2. Temperature vs Resistance of Auto T.C. Elements

Temperature °C	Resistance (Ohms) ±1%	
	3K	Pt100
0	2670	100.0
10	2802	103.8
20	2934	107.7
25	3000	109.6
30	3066	111.5
40	3198	115.4
50	3330	119.2
60	3462	123.1
70	3594	126.9
80	3726	130.8
90	3858	134.6
100	3990	138.5

5.4 396P and 396PVP ORP

5.4.1 Platinum Electrode Check

The platinum electrode may be checked as follows: There are two types of standard solutions which may be used to check the ORP electrode/transmitter system.

Type 1: One type of commonly used ORP standard solution is the saturated quinhydrone solution. Refer to Section 5.2.

⚠ CAUTION

The solution used during the following check is an acid and should be handled with care. Follow the directions of the acid manufacturer. Wear the proper protective equipment. If contact with skin of clothing is made, immediately rinse with plenty of clean water.

Type 2: A second ORP standard solution is the Ferric-Ferrous Ammonium Sulfate Solution (PN R508-16OZ), and it can be ordered as a spare part; otherwise, it can be prepared from the following recipe: Dissolve 39.2 grams of reagent grade ferrous ammonium sulfate, Fe(NH4)2 (SO4)2 • 6H2O and 48.2 grams of reagent grade ferric ammonium sulfate, FeNH4(SO4)2 • 12H2O, in approximately 700 milliliters of water (distilled water is preferred, but tap water is acceptable). Slowly and carefully add 56.2 milliliters of concentrated sulfuric acid. Add sufficient water to bring the total solution volume up to 1000 ml. This standard ORP solution, although not as simple to prepare as the quinhydrone recipe, is much more stable, and will maintain its millivolt value for approximately one year when stored in glass containers. This solution (ferric/ferrous

ammonium sulfate) will produce a nominal ORP of 476 +20 mV at 25°C when used with a saturated KCl/AgCl reference electrode and platinum measuring electrode. Some tolerance in mV values is to be expected due to the rather large liquid reference junction potentials which can arise when measuring this strongly acidic and concentrated solution. However, if the measuring electrodes are kept clean and in good operating condition, consistently repeatable calibrations can be carried out using this standard solution.

5.4.2 Cleaning Platinum Electrode

The electrode can be restored to normal operation by simply cleaning the platinum electrode with baking soda. Polish it by rubbing it with a damp paper towel and baking soda until a bright, shiny appearance is attained.

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Section 6: Diagnostics and Troubleshooting

6.1 54e/56/1056/1057/1066/3081/4081/5081/XMT Diagnostics and Troubleshooting

Many Rosemount Analytical Instruments and Transmitters automatically search for fault conditions that would cause an error in the measured pH value. Refer to the applicable Instruction Manual for a complete description of the analyzer's fault conditions.

Table 7-1, below, lists some of the diagnostic messages that indicate a possible sensor problem. A more complete description of the problem and a suggested remedy corresponding to each message is also listed.

TABLE 6-1. Troubleshooting with Advanced Diagnostics

DIAGNOSTIC MESSAGE	DESCRIPTION OF PROBLEM	REMEDY
"Calibration Warning" CALIbrAtE	1. Aged glass. 2. Sensor not immersed.	1. Perform buffer calibration. 2. Be sure electrode measuring tip is in process.
"Cracked glass failure" 6LASS fAIL	Broken or cracked glass.	Replace sensor.
"High reference impede" rEF fAIL or rEF WjArn	1. Liquid junction coated. 2. Reference Cell gel depleted. 3. Sensor not immersed.	1. Clean sensor; replace if necessary. 2. Replace sensor. 3. Be sure electrode measuring tip is in process.
"Input voltage high" "Input voltage low"	pH input shorted or sensor miswired.	Check wiring. Replace sensor if necessary.
"Old glass warning" 6LaSS WjArn	1. Glass electrode worn out. 2. Sensor not immersed.	1. Replace sensor. 2. Be sure electrode measuring tip is inprocess.
"Reference offset err" (offline only) Std Err	Reference electrode poisoned.	Replace sensor.
"Ref voltage high" "Ref voltage low"	1. Reference shorted or sensor miswired. 2. Sensor not immersed	Check wiring and installation. Replace sensor if necessary.
"Sensor line open" LInE FAIL	1. Open wire between sensor and analyzer. 2. Interconnecting cable greater than 1000 ft.	1. Check sensor wiring. 2. Relocate analyzer.
"Sensor miswired"	1. Open wire between sensor and analyzer. 2. Bad preamplifier.	1. Check wiring. 2. Replace preamplifier. (Code 02 only)
"Temp error high" "Temp error low" tEMP HI tEMP LO	1. Open or shorted RTD. 2. Temperature out of range.	1. Replace sensor. 2. Check process temperature.

6.2 Troubleshooting without Advanced Diagnostics

Table 7-2, below, lists common problems, causes and remedies typically encountered in process measurement.

TABLE 6-2. Troubleshooting without Advanced Diagnostics

Problem	Probable Cause	Remedy
Meter reads off scale. (Display reads overrange).	Defective preamplifier	Replace preamplifier (for code 02 sensors). For code 01, replace sensor.
	T.C. element shorted	Check T.C. element as instructed in Section 6.1 and replace sensor if defective.
	Sensor not in process. Sample stream is low or air bubbles are present.	Make sure sensor is in process with sufficient sample stream (refer to Section 2.0 for installation details).
	Open glass electrode	Replace sensor.
	Reference element open - no contact	Replace sensor.
Display reads between 3 and 6 pH regardless of actual pH of solution or sample.	Electrode cracked	Replace sensor.
Meter or display indication swings or jumps widely in AUTO T.C. Mode.	T.C. element shorted	Check T.C. element as instructed in Section 6.1 and replace sensor if defective.
Span between buffers extremely short in AUTO T.C. Mode.	T.C. element open	Check T.C. element as instructed in Section 6.1 and replace sensor if defective.
Sluggish or slow meter indication for real changes in pH level.	Electrode coated	Clean sensor as instructed in Sections 6.2 or Section 6.3.2. Replace sensor if cracked.
	Electrode defective	Replace sensor.
Transmitter cannot be standardized.	Electrode coated or cracked	Clean Sensor as instructed in Sections 6.2 or Section 6.3.2 Replace sensor if cracked.
	Defective preamplifier	Replace preamplifier.
Transmitter short spans between two different buffer values.	Aged glass electrode or high temperature exposure	Replace sensor.
	Electrode coated	Clean Sensor as instructed in Section 6.2 or Section 6.3.2. Replace sensor if cracked.
	Air bubbles trapped in sensor end between glass bulb and sensor body	Shake the sensor in solution. See Section 2.0 for mounting guidelines.

TABLE 6-3. Model 396P and 396PVP pH/ORP Replacement Parts and Accessories

PN	DESCRIPTION	QUANTITY
11275-01	Sensor Handrail Mounting Assembly	
2002011	Flow Cell, CPVC, 1 inch FNPT	
23242-02	Mounting Adapter, Insertion, 1 -inch MNPT (304 S.S.) X 1" FNPT (PEEK)	
23309-03	Junction Box, for remote preamplifier Code-50	
23309-04	Junction Box, for remote preamplifier Code-54	
23646-01	Cable, Extension (Prepped) for Models 54, 81, 3081, 4081, and 5081	
23555-00	Junction Box with preamplifier, Models 54, 81, 3081, 4081, and 5081 compatible	
23557-00	Preamplifier, remote for Junction Box, Models 54, 81, 3081, 4081, and 5081 compatible	
22698-00	Preamplifier, Plug-in, Model 1003 compatible (for Code 02-50)	1
22698-02	Preamplifier, Plug-in, Models 1181 and 1050 compatible (for Code 02-50)	1
22698-03	Preamplifier, Plug-in, Models 1054, 1054A, 1054B, 2054, and 2081 compatible (for Code 02-54)	1
22719-02	Junction Box, w/o Preamplifier	
33081-00	Adapter Insert, PEEK, 1 X 3/4-inch, for 23242-02	
7901631	Shroud, PVC	
9200254	Cable, 4 conductor, 22 AWG, shielded pair, for 1054/A/B, 2054, and 1181	
9200273	Cable, Extension (Unprepped) for Models 54, 81, 3081, 4081, and 5081	
23645-06	15 ft (4.6 m) cable with mating VP connector with BNC on transmitter end	
23645-07	15 ft (4.6 m) cable with mating VP connector with bare wires on transmitter end	
9210012	Buffer Solution, 4.01pH, 16 oz	4
9210013	Buffer Solution, 6.86pH, 16 oz	4
9210014	Buffer Solution, 9.18pH, 16 oz	4
9322014	Union, KYNAR[1]	
9320057	Union, PVC	
9120516	BNC Adapter	
915240-04	Tee, Flow-through, 2" PVC, 1" NPT	
9550175	O-ring for Mounting Adapter (23242-02)	
R508-160Z	ORP Standard Solution, 460mV ±10 at 20°C	
23550-00	Junction Box with Extension Board, Models 54, 81, 3081, 4081, and 5081 compatible	
661-898695	Cable 5 Conductor (for Model 2700 only)	

ROSEMOUNT® Analytical

CE

EC Declaration of Conformity

396P

We,

Emerson Process Management
Heath Place - Bognor Regis
West Sussex PO22 9SH
England

Declare under out sole responsibility that the product,

396P

manufactured by,

Emerson Process Management
Rosemount Analytical
2400 Barranca Parkway
Irvine, California 92606
USA

to which this declaration relates, is in conformity with the provisions of the European community Directives, including the latest amendments, as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Community notified body certification, as shown in the attached schedule.

(signature)

September 29, 2010
(date of issue)

Andy Kemish
(name printed)

Vice President Analytical, Europe
(function name printed)

EMERSON. Process Management

ROSEMOUNT® Analytical

Schedule
EC Declaration of Conformity

CE

ATEX Directive (94/9/EC)

Provisions of the directive fulfilled by the equipment:

Equipment Group II, Category 1 G — Ex ia IIC T4 Ga (Ta = 80°C)
Ex ia IIC T5 Ga (Ta = 40°C)

396P Sensor

Baseefa03ATEX0416X ~~ Intrinsically Safe Certificate

EN 60079-0:2006 EN 60079-11:2007 EN 60079-26:2007

Special Conditions for safe use

1. All pH/ORP sensors have a plastic enclosure which must only be cleaned with a damp cloth to avoid the danger due to a build up of an electrostatic charge.
2. All pH/ORP sensor Models are intended to be in contact with the process fluid and may not meet the 500V r.m.s. a.c. test to earth. This must be taken into consideration at installation.

ATEX Notified Bodies for EC Type Examination Certificate

Baseefa [Notified Body Number: 1180]
Rockhead Business Park, Staden Lane
Buxton, Derbyshire SK17 9RZ
United Kingdom

ATEX Notified Body for Quality Assurance

Baseefa [Notified Body Number: 1180]
Rockhead Business Park, Staden Lane
Buxton, Derbyshire SK17 9RZ
United Kingdom

EMERSON. Process Management

WARRANTY

Seller warrants that the firmware will execute the programming instructions provided by Seller, and that the Goods manufactured or Services provided by Seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. **Consumables, such as glass electrodes, membranes, liquid junctions, electrolyte, o-rings, catalytic beads, etc., and Services are warranted for a period of 90 days from the date of shipment or provision.**

Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products.

If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, promptly correct any errors that are found by Seller in the firmware or Services, or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services.

All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by an authorized Seller representative. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller.

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller. Except as otherwise expressly provided in the Agreement, THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

RETURN OF MATERIAL

Material returned for repair, whether in or out of warranty, should be shipped prepaid to:

Emerson Process Management
Rosemount Analytical
2400 Barranca Parkway
Irvine, CA 92606

The shipping container should be marked:

Return for Repair
Model _____

The returned material should be accompanied by a letter of transmittal which should include the following information (make a copy of the "Return of Materials Request" found on the last page of the Manual and provide the following thereon):

1. Location type of service, and length of time of service of the device.
2. Description of the faulty operation of the device and the circumstances of the failure.
3. Name and telephone number of the person to contact if there are questions about the returned material.
4. Statement as to whether warranty or non-warranty service is requested.
5. Complete shipping instructions for return of the material.

Adherence to these procedures will expedite handling of the returned material and will prevent unnecessary additional charges for inspection and testing to determine the problem with the device.

If the material is returned for out-of-warranty repairs, a purchase order for repairs should be enclosed.

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Section 7: Return of Material

7.1 General

To expedite the repair and return of instruments, proper communication between the customer and the factory is important. Before returning a product for repair, call 1-949-757-8500 for a Return Materials Authorization (RMA) number.

7.2 Warranty Repair

The following is the procedure for returning instruments still under warranty:

1. Call Rosemount Analytical for authorization.
2. To verify warranty, supply the factory sales order number or the original purchase order number. In the case of individual parts or sub-assemblies, the serial number on the unit must be supplied.
3. Carefully package the materials and enclose your "Letter of Transmittal" (see Warranty). If possible, pack the materials in the same manner as they were received.
4. Send the package prepaid to:
   Rosemount Analytical
   2400 Barranca Parkway
   Irvine, CA 92606
   Attn: Factory Repair
   RMA No. _____
   Mark the package: Returned for Repair
   Model No. ____

7.3 Non-Warranty Repair

The following is the procedure for returning for repair instruments that are no longer under warranty:

1. Call Rosemount Analytical for authorization.
2. Supply the purchase order number, and make sure to provide the name and telephone number of the individual to be contacted should additional information be needed.
3. Do Steps 3 and 4 of Section 9.2.

NOTE: Consult the factory for additional information regarding service or repair.

LIQ_MAN_396P_396PVP
Rev. B
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